EPSRC & MRC Centre for Doctoral Training in Next-Generational Statistical Science: the Oxford-Warwick Statistics Programme

Course Handbook 2015-2016

updated September 2015

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1. Introduction

Welcome to the Centre for Doctoral Training (CDT) in Next-Generational Statistical Science. The centre is run jointly by the Statistics Departments of the University of Oxford and the University of Warwick, and supported by the Engineering and Physical Sciences Research Council (EPSRC) and the Medical Research Council (MRC).

The Centre will produce new research leaders for industry and academia. We will train graduate researchers in the theory, methods and applications of Statistical Science for modern data-intensive environments and large-scale models. This is the first Centre of its type in the world.

In developing the Centre we recognised a critical need for the training of a new type of statistical researcher who can meet the emerging challenges of modern statistical data analysis. Statistical researchers will increasingly need to be versed in the manipulation and handling of massive, heterogeneous data. Successful researchers will be able to program on distributed high-performance computing and communicate effectively with 'data owners' (before and after the data collection), using these skills and knowledge to develop the new theories, methods and algorithms needed for the analysis of "big data" on massively parallel modern computing devices.

We are witnessing the most exciting of times to be working in Statistics. We hope you find your journey over the next four years challenging, rewarding and ultimately enjoyable.

All the best for your academic year
Professor Chris Holmes
(CDT Director)

How this Course Handbook will help you
This handbook is designed to help you understand the course structure and how the modules are laid out; what is required from you regarding your contribution to this course; who the key contacts are and who you can go to if you need support. Much of the information is focused on your first year. Please be aware that details for years 2-4 may be subject to change.

This handbook applies to students starting the OxWaSP programme in Michaelmas 2015. The information in this handbook may be different for students starting in other years. Every effort is made to ensure that information offered from this Handbook is accurate at the time of going online. Notice of misprints or errors of any kind, and suggestions for improvements in this booklet should be addressed to the Programme Administrator mcbride@stats.ox.ac.uk in the Department of Statistics.

The Examination Regulations relating to this course are available at http://www.admin.ox.ac.uk/examregs/2014-15/dtproginmpls/ If there is a conflict between the information in this handbook and the Examination Regulations then you should follow the Examinations Regulations. If you have any concerns then please contact the Programme Administrator.

2. Programme Background

The Centre was created in response to a call from the EPSRC for the funding of centres for doctoral training. Our proposal to the EPSRC responds to the now-critical demand for training centres for doctoral students in modern statistical methods for data intensive environments.

Objectives

- Training researchers in the core statistical methodology, computation and theory underpinning modern applications, involving large high-dimensional, heterogenous data;
- Enhancing interdisciplinary collaboration, methodological rigour and joint understanding in efficient scalable statistical methods for scientific data analysis;
- Building a community of UK and International scholars, concerned with developing these approaches and methodologies;
- Establishing a centre for a network of different interest groups and disciplianary approaches working towards providing future industrial and academic research leaders, by enhancing collaboration between the academic community and practioners (government, international institutions and private sector);
- Investing in outreach programmes such as the engagement of more women in schools into vocations in statistics.

Training strategies

The Centre will give graduates a **breadth of knowledge across multiple domains**. A working knowledge of distributed databases and algorithm design, many-core and distributed computing will complement your understanding of core topics in probability, statistical theory and statistical methods. OxWaSP students have the opportunity to engage with over 40 cutting-edge researchers in two world-leading departments. Peer-to-peer learning is another important aspect of the training environment. The Centre will bring students together regularly, to share ideas and develop a broad appreciation of modern statistics.

The Centre will bring together industrial partners to share ideas and give you some **insight into the research challenges and opportunities in commercial and social enterprise**. The academic training we provide will be enhanced by visits, lectures, internships and co-supervision from global partners including Amazon, Google, GlaxoSmithKline, MAN and Novartis, as well as smaller entrepreneurial start-ups Deepmind and Optimor.

Statistical data analysis in industry and within scientific consortia is increasingly undertaken by large interdisciplinary teams, involving database managers, programmers, domain experts and statisticians. **Excellent communication skills, and experience of team building and team working**, are needed for success in this space. Our programme builds these skills along the way, through direct training in transferable skills and as an integral part of every module.

In their third year, the Centre is coordinating an international exchange visit for our graduate trainees. We are resourced to support study visits for two to three months abroad at some of the world's leading centres in data-intensive statistics, including UC Berkeley, Columbia University, Duke University, University of Washington, Eidgenössische Technische Hochschule (ETH) Zurich and National University of Singapore (NUS) Singapore. This visit will contribute greatly to the development and breadth of knowledge of the student.

We are aiming to maximize the opportunity for you to reach your full potential and make major contributions to our field.

3. Programme Summary

This is a four year Doctor of Philosophy (DPhil) in Statistical Science. It is a joint EPSRC and MRC programme led by the Statistics departments of Oxford and Warwick.

In the first year of the programme all students are based at Oxford. In their first week in Oxford they have an induction week focused on team building and developing practical skills in their new research and training environment.

Over the next two terms students work on eight two-week taught modules, four in each term. Teaching is co-led by faculty from Oxford and Warwick (at least one from each institute). The two week modules have a fairly regular structure. The following should be typical. Monday and Tuesday of the first week of each module is given over to lectures and exercises. Over the next five working days you will read some of the original literature and write a report. The module leaders will direct you as to what is expected. On the Wednesday of the second week you will complete your report. We expect a series of 'pizza lunches' to be organised for these Wednesdays: you will get a chance to interact with people from industry and academia who do research in areas related to the topic of the module. See section 10 for more detail. Throughout the module, academics from Oxford and Warwick will talk about their work. This gives you a chance to find out what is going on and informs your choice of supervisor. At the end of the second week of each module there will be a mini-symposium at Warwick on the theme of the module with one internal and one external speaker. The modules content is detailed in section 6.

We will also send you on a 5-day course, at the end of July 2016, run by Prof Mike Giles, Professor of Scientific Computing at Oxford. You will learn how to develop applications to run on NVIDIA GPUs using the CUDA programming environment. No prior experience with parallel computing is assumed. Click here for more information http://people.maths.ox.ac.uk/~gilesm/cuda/

In the second half of the year you will complete two small projects ('mini-projects'). You have about 10 weeks to work on each of these. In your mini-project you will review and analyse current and existing research, providing your own commentary and insights. The projects will typically include some small problem for you to solve. The purpose of the project work is twofold. First, we are training you to complete a small piece of independent research and write it up in a coherent way, respecting standard scientific writing conventions. Secondly, this is a chance for you to find out more about supervisors, their subjects and how they work, and decide on potential supervisors.

At the end of the first year, subject to supervisor availability and interest, you will choose a supervisor for your main doctoral research project. Students enrolled at Warwick will choose a Warwick supervisor and students enrolled at Oxford will choose an Oxford supervisor. Warwick students will leave for Warwick but continue interaction with Oxford CDT students and academics. We cannot promise you will get your first choice (supervisors have some say, and several students may choose the same supervisor). In practice we expect the supervisor pool is large enough, and your talents and diversity of interests are large enough, that there will be few conflicts.

Having chosen a supervisor you will spend the next two to three years working with your chosen supervisor carrying out a program of research towards a doctorate.

Programme outline

First Year - First term (Oxford Michaelmas Term)
Oxford/Warwick Annual Workshop (Induction week)   P7
Induction week followed by four two-week assessed modules
Module 1: Computational Statistics and Statistical Computing   P9
Module 2: Probability & Approximation   P11
Module 3: Stochastic Simulation   P12
Module 4: Scalable Methods & Analysis of Large Complex Data   P13
Advisor interviews (progress and monitoring)   P19
1st APTS residential broadening training week   P25

First Year - Second Term (Oxford Hilary Term)
Four two-week assessed modules
Module 5: Machine Learning   P14
Module 6: Bayesian Inference   P15
Module 7: Applied Statistics   P16
Module 8: Time Series and Stochastic Processes   P17
Advisor interviews (progress and monitoring)   P19
2nd APTS residential broadening training week   P25

First Year - Third Term (Oxford Trinity Term)
First mini-project   P18
3rd APTS residential broadening training week   P25
Advisor interviews (progress and monitoring)   P19
CUDA course (programming a GPU)   P5
Second mini project   P18
4th APTS residential broadening training week   P25

Second year
Your supervisor will be assigned by the start of the year   P18
Monitoring via termly progress reports   P19
Berlin trip/Amazon study week   P7
18 months: first major academic milestone (transfer to PhD/DPhil) P20-23

Third year
International research placement in overseas university research centre P7
(subject to progress)
Monitoring via termly progress reports   P19
36 months: second major academic milestone at the end of this year P20-23
(draft thesis accepted)

Fourth year
Monitoring via termly progress reports   P19
You must have completed your research and submitted your thesis by P20-23
the end of the fourth year.

All years: transferable skills training, public engagement, annual workshop, three day off-site retreat. Industrial internships are possible in any year including first year mini-projects.

4. OxWaSP-Funded Research-Network Activities

Oxford/Warwick Annual Workshop

In early autumn you will have the opportunity to attend an Oxford/Warwick workshop at Warwick. All CDT students and members of the supervisor pool will be invited. By the fourth year of its operation, the programme will connect around fifty students and perhaps twenty five supervisors. CDT Alumni will be encouraged to return and share their experience. Second and third year CDT students will present posters on their work to date.

Three-day off-site retreat

Towards the end of each year, all OxWaSP students will attend an annual off-site 2-3 day residential training retreat with a small number of chalk talks each day. There will be no computers and lots of time for reading and open discussion. You will be encouraged to view your work from a distance, to think about the year ahead and your aspirations, to consider the really big open questions. You will be assigned to small groups, broken down by the five themes (noted previously in this handbook) and given two or three papers to read and discuss in your groups. You will then be asked to present your major finding to your peers. Each student, in consultation with their supervisor, will also be asked to bring along two or three papers to read while away. Each evening a member of faculty will lead a round table discussion on a high-level topic such as ``reproducible research, why bother?'', or ``what's the use of Statistics if all models are wrong?''. The retreat is designed to enhance research independence and help develop communication skills and small group working.

Amazon adventure

In April/May of your second year, students will attend a week-long course at Amazon's research centre in Berlin. Two senior academics and a senior Amazon researcher will co-design and co-lead an advanced training course on topics in Statistical Machine Learning and Computing for big-data analysis.

International exchange visit in year 3

In your third year, subject to satisfactory progress, you may spend 2-3 months abroad, as part of an exchange program with UC Berkeley, Columbia University, University of Washington Seattle, ETH Zurich and the National University Singapore. Full funding for this placement is available within the programme. These universities have thriving statistics research with substantial PhD programmes in the CDT area of statistical science for data-intensive applications. Exchange students from participating institutes are also invited to Oxford-Warwick so we anticipate welcoming 10 international students a year. These students will join the CDT cohort providing an enriching experience and new perspectives for all our students and associated faculty.

5. Staff

Key CDT staff
Listed below are main contacts you will encounter in your day to day activities:

Title	Name	Email address
CDT Director Professor	Chris Holmes	cholmes@stats.ox.ac.uk
Acting CDT Deputy Director Professor	Chenlei Leng	C.Leng@warwick.ac.uk
Academic Advisor	François Caron	caron@stats.ox.ac.uk
CDT Programme Administrator	Karyn McBride	mcbride@stats.ox.ac.uk
Postgraduate Support Officer – Warwick	Eleanor Ingram	stats.pg.support@warwick.ac.uk
Director of Graduate Studies	Professor Gesine Reinert	reinert@stats.ox.ac.uk
Deputy Director of Graduate Studies/Student & Liaison Officer	Sarah Filippi	filippi@stats.ox.ac.uk
Academic Administrator	Jan Boylan	boylan@stats.ox.ac.uk
Departmental Administrator	TBA	TBA
Statistics library c/o	Jan Boylan	lib@stats.ox.ac.uk
Statistics Reception	Emma Bodger	bodger@stats.ox.ac.uk
IT support	Helpdesk	ithelp@stats.ox.ac.uk

Affiliated Staff
The Centre's pool of supervisors is led by CDT Director Professor Chris Holmes at Oxford and Acting CDT Deputy Director Professor Chenlei Leng at Warwick.

Oxford and Warwick 's current pool of Supervisors can be viewed here:
http://www.oxwasp-cdt.ac.uk/people.html

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*6.Modules Outline

MODULE 1 TITLE: COMPUTATIONAL STATISTICS AND STATISTICAL COMPUTING
Lead: Krzystof Latuszynski **(Warwick)**   **Co-Lead:** Lawrence Murray **(Oxford)**

Date of Module: 12th – 23rd October 2015

Summer Reading
Please see the Lecture Notes located in the MSc course and do the Practicals:
http://www.stats.ox.ac.uk/~evans/teaching.htm
By the time you arrive you should be comfortable with this content, or else have questions ready to ask the module leaders when you arrive. We will assume you have a basic knowledge of R before you arrive. There will be a review exercise early in the module.
If you are keen to do more reading, there are further books mentioned in the notes.

Abstract
Computational statistics is one of the most dynamic areas of research in modern statistics and is key to such fields as Bayesian inference, model choice, Graphical models, big data and others. In this course students will be exposed to main concepts of computational statistics and to milestone ideas, such as Monte Carlo, Markov chain Monte Carlo, Sequential Monte Carlo, Reversible Jump, Approximate Bayesian Computation, Intractable Likelihood, Monte Carlo Expectation Maximisation, Simulated Annealing, Belief Propagation, LASSO, LARS, to name a few, and will study two of them in depth based on original research papers. The study will involve analysing real data and coding one of the methodologies. The course is designed not only to cover computational statistics and coding in R, but also to support acquisition of transferable skills such as collaborative work, giving and receiving constructive feedback and good practice in producing code.

Objectives
After the course the students will acquire the following skills:
- Familiarity with R package and ability to implement mainstream computational algorithms
- Reading and discussing code; understanding the benefits of producing clear well written code
- Collaborate in understanding a research problem and write code
- Critically assessing someone else's code and work, giving constructive feedback
- Receiving critical feedback and using it constructively to improve work
- Exposure to several mainstream topics in computational statistics
- Thorough familiarity with two of these topics (project done + project reviewed)
- Ability to present work and research

Assessment
Each team will produce a report of maximum 8 pages including graphs and references as an R vignette. The report will be marked. Each pair will produce code and do a presentation. There will be feedback on the code and presentation.

List of Papers

A subset of papers from the following list will be presented along with projects, along with possible additions.

1. Duane, S., Kennedy, A. D., Pendleton, B. J., & Roweth, D. Hybrid monte carlo. Physics Letters B, 195(2): 216-222, 1987.

2. (2014*) Tibshirani, R. Regression shrinkage and selection via the LASSO. J. Roy. Statist. Soc. Ser. B., 58(1): 267-288, 1996.

3. Efron, B.; Hastie, T.; Johnstone, I.; Tibshirani, R. Least angle regression The Annals of statistics, Institute of Mathematical Statistics, 2004, 32, 407-499

4. Propp, J.G. and Wilson, D.B. Exact sampling with coupled Markov chains and applications to statistical mechanics. Random structures and Algorithms, 9: 223-252, 1996

5. (2014*) Del Moral, P., Doucet, A & Jasra, A. Sequential Monte Carlo samplers. J. Roy. Statist. Soc. Ser. B., 68(3): 411-436, 2006.

6. (2014*) Lauritzen, S.L. and Spiegelhalter, D.J. Local computations with probabilities on graphical structures and their application to expert systems, Journal of the Royal Statistical Society. Series B. 50(2): 157–224. 1988.

7. Green, P. Reversible jump Markov chain Monte Carlo computation and Bayesian model determination Biometrika, Biometrika Trust, 1995, 82, 711-732

8. (2014*) Andrieu, C. & Roberts, G. O. The pseudo-marginal approach for efficient Monte Carlo computations The Annals of Statistics, JSTOR, 2009, 697-725

9. (2014*) Haario, H.; Saksman, E. & Tamminen, J. An adaptive Metropolis algorithm Bernoulli, JSTOR, 2001, 7, 223-242

10. Roberts, G. & Rosenthal, J. Optimal scaling for various Metropolis-Hastings algorithms Statistical Science, Institute of Mathematical Statistics, 2001, 16, 351-367

11. Roberts, G. O. & Stramer, O. On inference for partially observed nonlinear diffusion models using the Metropolis–Hastings algorithm Biometrika, Biometrika Trust, 2001, 88, 603-621

12. Benjamini, Y. & Hochberg, Y. Controlling the false discovery rate: a practical and powerful approach to multiple testing. Journal of the Royal Statistical Society. Series B (Methodological), JSTOR, 1995, 289-300

13. R.F. Barber, E. Candes, Controlling the false discovery rate via knockoffs, Annals of Statistics, 2015

14. Efron, B. Microarrays, Empirical Bayes and the Two-Groups Model. Statistical Science, 2008, v23 (1), pp 1-22.

15. Scott, J. G.; Kelly, R. C.; Smith, M. A.; Kohn, A. & Kass, R. E. False discovery rate regression: an application to neural synchrony detection in primary visual cortex. arXiv preprint arXiv:1307.3495, 2013

16. Y. Guan, M. Stephens, Bayesian variable selection regression for genome-wide association studies and other large-scale problems, The Annals of Applied Statistics, 2011, pp. 1780-1815

MODULE 2 TITLE: PROBABILITY & APPROXIMATION
Leader: Wilfrid Kendall **(Warwick)**   **Co-Leaders:** Christina Goldschmidt, Judith Rousseau **(Oxford)**

Dates of Module: 26th October – 6th November 2015

Abstract: Approximation methods in probability have played a significant role in statistics since the inception of mathematical probability (for example, the key results of laws of large numbers, central limit theorems, laws of iterated logarithm, large deviations). More recently, there has been intense interest in rigorous approximation methods, especially the famous Stein approximation, with particular bearing on the complex data problems arising in genetics and more generally in network theory. Modern approaches to mathematical statistics make intense use of probabilistic tools such as exponential inequalities. Finally the new paradigm "big *n*, big *p*, little *t*" is placing a high premium on essentially probabilistic methods to carry out rapid approximation of key statistical quantities for complicated and very large datasets.
We will begin by discussing notions of probabilistic convergence and approximation, and then describe the classical probabilistic limit theorems in situations of natural generality and emphasizing the links between them. We will discuss approaches which can be seen as precursors to the notions of Stein approximation, and this will lead naturally on to discussion of approximation particular in the Poisson case (the celebrated Stein-Chen approximation methodology, which is now finding widespread application in applied problems). We will then turn to statistical applications of exponential inequalities in empirical process theory and Bayesian non-parametrics, and conclude with discussion of a contemporary topic, such as the recent work by Witten and Candès on random linear algebra which has great relevance to fast calculations for big data.

Assessment
Students will be asked to individually review various different aspects of recent papers on probability and approximation drawn from the recent literature. These should be handed in by Thursday 9.00am. Three teams of students will then give three joint critical presentations on the papers they have studied – we will seek to balance the teams to ensure that people with strong theoretical background work together with people of strong computational background to allow them to learn from each other as well as from the material which they will be studying.

Suggested Background Reading
Barbour, A. D., Holst, L., & Janson, S. (1992). *Poisson approximation*. OUP.

Grimmett, G. R., & Stirzaker, D. (2001). *Probability and random processes*. OUP.
Van der Vaart, A. (2000). *Asymptotic statistics*. CUP.

MODULE 3 TITLE: STOCHASTIC SIMULATION
Leader: Arnaud Doucet **(Oxford)**   **Co-Lead:** Anthony Lee **(Warwick)**

Date of Module: 9th November – 20 November 2015

Abstract
For most complex statistical models such as latent variable models or spatial models, inference cannot be carried out analytically and relies on simulation techniques. The aim of these lectures is to introduce modern stochastic simulation methods. We will concentrate on Markov chain Monte Carlo (MCMC) methods and Sequential Monte Carlo (SMC) methods. The material is mostly theoretical but we will illustrate these techniques on various applications.

Assessment
Students will be asked to individually review and assess some reference papers in the statistics literature or reproduce analyses found in the recent literature. These should be handed in by Thursday 9.00am. Three teams of student will then give three joint critical presentations
on the papers they have studied that very day.

Suggested Background Reading
Liu, J.S., Monte Carlo methods for scientific computing, Springer.
Robert, C. and Casella, G., Monte Carlo statistical methods, Springer

MODULE 4 TITLE: SCALABLE METHODS & ANALYSIS OF LARGE COMPLEX DATA
Leader: Louis Aslett **(Oxford)**   **Co-Lead:** Chenlei Leng **(Warwick)**

Date of Module: 23rd November – 4 December 2015

Abstract
Modern statistics is facing challenges both from rapidly growing datasets and increasingly complex models. Consequently, application of traditional inferential techniques is often untenable due to computational intractabilities, leading to a tremendous current research focus on methods which can scale to handle these often coinciding challenges.

In particular, many existing techniques such as MCMC are inherently sequential in nature which is discordant with current trends in computing, where massively parallel architectures are increasingly dominant. This has led to a situation where growth in model complexity and data size has exceeded advances in the serial execution speed of computers.

This module will explore the current landscape of high performance computing options, including multi-core architectures, GPU computing, clusters and cloud computing. There will be an introduction to salient features of these architectures which researchers should consider when developing new methodology and implementations. A basic hand on knowledge of their use will also be covered and there will be a review of the latest statistics literature which has sought to exploit these trends.

Assessment
Students will form teams and select a state of the art paper which was reviewed during the week. One or more of the high performance computing techniques covered should be used to create a basic functioning implementation. The implementation should be submitted in the form of a documented R package, complete with examples and a short vignette succinctly summarising the methodology and detailing its usage by 9am on Thursday of the second week.

Suggested preparation
Students should review the material from module 1 and be very comfortable with R.
Students should also have advanced in their self-study of C to the point that they can implement algorithms comfortably and understand pointers and pointer arithmetic.

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MODULE 5 TITLE: MACHINE LEARNING
Leader: Yee Whye Teh **(Oxford)**   **Co-Lead:** Ben Graham **(Warwick)**

Date of Module: 18th January – 29th January 2016

Abstract: Machine learning is an amalgamation of a wide range of statistical and computational methods allowing machines to "learn" to "act intelligently". For example, modern email spam filters can intelligently and accurately classify emails by learning from examples of spam and non-spam emails, and adapt to the specific distribution of emails and preferences of individual users when given further examples (each time you click on the "spam" button of an online email provider).

In this module you will be exposed to the important concepts underpinning machine learning (supervised and unsupervised learning, generalization, overfitting, bias/variance tradeoff, empirical risk minimization). In addition, we will delve deeper into a few important areas: learning and inference in graphical models, variational inference (including variational Bayes, belief propagation, expectation propagation), Bayesian nonparametric modelling (Gaussian processes, Dirichlet processes, hierarchical Dirichlet processes), and deep learning (multi-layered neural networks, convolutional networks, optimisation and regularisation methods, applications to machine vision and speech).
Parts of the teaching in this module will take the form of an "inverted classroom", where students are expected to view selected online lectures beforehand, and come to class prepared with questions for discussion.

Assessment
Students will form into 4 teams, with each team investigating a set of related techniques solving a particular problem. This will involve reading and digesting the core papers of an area, implementing the techniques, and applying them to datasets (including pre-processing and analyses of results). A report (maximum 8 pages in NIPS proceedings format, including figures, tables and references) is expected by the second Thursday, followed by a presentation on Friday.

Potential topics are: deep belief networks, deep learning, convolutional networks, topic models, Bayesian nonparametric mixture models, matrix factorization, variational inference in Gaussian processes.

Suggested Background Reading
K Murphy. Machine Learning: a Probabilistic Perspective, MIT Press.
D Koller & N Friedman. Probabilistic Graphical Models: Principles and Techniques, MIT Press.
C Bishop. Pattern Recognition and Machine Learning. Springer.
M Wainwright & M Jordan (2008). Graphical Models, Exponential Families, and Variational Inference, Foundations and Trends in Machine Learning.

Suggested Background Viewing
Martin Wainwright's http://videolectures.net/mlss2011_wainwright_messagepassing/
Yee Whye Teh's http://videolectures.net/mlss09uk_teh_nbm/
Yoshua Bengio's http://videolectures.net/icml09_bengio_lecun_tldar/
Geoff Hinton's http://videolectures.net/jul09_hinton_deeplearn/
Carl Rasmussen's http://videolectures.net/epsrcws08_rasmussen_lgp/

MODULE 6 TITLE: BAYESIAN INFERENCE

Leader: Christian Robert **(Warwick)**   **Co-Lead:** Chris Holmes **(Oxford)**

Date of Module: 1st February – 12th February 2015

Abstract
The Bayesian approach to statistics offers a holistic perspective on the field in that it allows for a complete coverage of the various purposes of Bayesian inference and design. The introduction we propose in this module will remain at the level of classical parametric models in finite dimension, but will address the specificities and challenges of the Bayesian approach to statistics. We will cover the fundamental connection between statistical decision theory and Bayesian statistics, the finite and asymptotic properties of the Bayesian procedures, the construction and assessment of prior distributions, the different approaches to Bayesian testing and model choice, and the specific case of hierarchical models. While the material is mostly theoretical, there will be illustration labs in R to gain some intuition about the construction and manipulation of posterior distributions.

Assessment
Students will be asked to individually review and assess some reference papers in the Bayesian literature or reproduce analyses found in the recent literature. These should be handed in by Thursday 9.00am. Three teams of student will then give three joint critical presentations on the papers they have studied that very day.

Suggested Background Reading
Gelman et al. (2013) Bayesian Data Analysis, CRC Press
Hoff (2009) A First Course in Bayesian Statistical Methods, Springer
Marin and Robert (2014) Bayesian Essentials with R, Springer
Robert (2007) The Bayesian Choice, Springer

MODULE 7 TITLE: APPLIED STATISTICS
Leader Chris Holmes **(Oxford)**   **Co-Leader:** Mark Fiecas **(Warwick)**

Date of Module: 15th February – 26th February 2016

Abstract
This module will emphasise the principles and best practice lifecycle of good statistical data analysis and reproducible research. We will cover issues in optimal experimental design, data exploration via charts and graphs, clustering algorithms, tentative model design and model building, exploration of model fit, unbiased assessment of model performance and model adequacy, and model uncertainty including variable selection. The module will consider both Bayesian and classical approaches to statistical analysis. The emphasis will be on teaching through real world applications and hands on data analysis using R.

Assessment
Students will be asked to undertake an illustrative data analysis project keeping a study log-book of their activities, as well as review exemplar papers of good and bad statistical practice. Individual reports should be handed in by Thursday 9.00am of week 2. Students will work in small teams on a real-world study and present their insights and analysis on the Friday of Week 2.

Suggested Background Reading
Hastie et al. (2009) Elements of Statistical Learning, Springer
Gelman et al. (2013) Bayesian Data Analysis, CRC Press
Tufte (2001) The visual display of quantitative information

MODULE 8 TITLE: TIME SERIES AND STOCHASTIC PROCESSES
Leader Barbel Finkenstädt **(Warwick)**   **Co-Lead** François Caron **(Oxford)**

Date of Module 29th February – 11 March 2016

Abstract
Time series models are widely required in many domains in science and commerce where data is very rich and processes complex. The module will begin by reviewing standard classes of univariate classes of time series models discussing in some detail how even in these simple domains problems associated with unidentifiability, non-consistency and complex structures within likelihoods exist. Concentrating on state space formulations we then examine how these difficulties start to multiply in high dimensional domains. Various solutions are then presented which address these difficulties through penalisation, the structuring of multivariate time dependences through graphical methods, and through focusing on conditionally conjugate classes of model. Practical examples of two recent families of such models will then be presented. The first will concern the discovery of causal pathways over time form protiomic data.

The second example will show how recent experiments, some taking place now in Oxford, associated with fMRI stochastic brain images, can be analysed for the existence of connectivity pathways. We will then give a whistle stop tour of some much related classes of models currently on the frontier of research - discrete Markov chains, discrete spatial and dynamic graphical Models, Markov and semi Markov processes in complicated domains. Random graphs, Gaussian processes and functional data analysis. Examples will include stochastic models of radicalisation and the study
of the evolutionary processes behind spoken languages.

Assessment
Students will be asked to individually review various different aspects of recent papers on multivariate time series models drawn from the recent literature. These should be handed in by Thursday 9.00am. Three teams of student will then give three joint critical presentations on the papers they have studied.

Suggested Background Reading
West and Harrison (1997) Bayesian Forecasting and Dynamic Models, Springer
Norris (2008) Markov Chains Cambridge University Press
Ramsay and Silvermain (2006) Functional Data Analysis Springer

* Content of modules may be subject to some change and requires the student to be aware of these changes.

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7. Projects and Supervisors

Mini-Projects

You will undertake two mini-projects within your first year (the **first** between **Monday 21 March** and **Friday 10th June** and the **second** between **Monday 13th June** and **Wednesday 14th September**). Students are required to produce a dissertation for each project in the style of a research paper with a limit of 5,000 words including references, abstracts and appendices. While original and independent insight is important, you are not required to make substantial research contributions at this stage. The mini-project dissertations will be assessed by the project supervisor and the director/co-director.

A list of mini-project titles for your first mini-project, proposed by the Centre's extensive Supervisory Pool (Oxford/Warwick) will be circulated to you at the beginning of December. You will choose the names of your Supervisor and the titles your first mini-project from this list. You may be asked to provide several choices, in order to allow for popular projects. In some cases, project supervisors may be able to accommodate more than one student on a project. This is a chance to construct your own project or revise one of the published projects. The deadline for submitting the names of your supervisor and the mini-projects is **Monday 14 March**. In order to give you time to explore your second mini-project, we will publish the titles of the second mini projects on **Friday 18 March.** For your second mini-project, we will expect the names of your proposed Supervisors and choices of mini-project titles to be submitted by **Tuesday 24 May**. You will be able to choose a mini-project supervisor from the combined pool of Oxford and Warwick. Since you are expected to choose a thesis supervisor from the University that admitted you, you should almost certainly take at least one project with your 'home' institution.

Each project should have a different supervisor.

Submission dates for the mini-projects are as follows:
- 1st mini-project deadline: **Midday, Friday 10 June 2016**
- 2nd mini-project deadline: **Midday, Wednesday 14th September 2016**

Choosing a Thesis project and Supervisor

During the year there are many opportunities to meet potential supervisors and discuss projects. You will spend time with the module leaders and co-leaders, and other members of the supervisor pool will give talks in the course of the taught modules in the first two terms. This will be a basis for choosing your projects. It is likely, but not essential, that one of your project supervisors will become your thesis supervisor. Certainly, the mini-projects are a good way to get to find out if some particular area is of interest to you. Towards the end of the first year, late in the second mini-project, you will submit the names of a few potential supervisors and research areas to the CDT management committee. They will match supervisors and students. The management committee will do all it can to meet supervisor and student demands. However, we cannot promise you will get your first choice so make sure you have identified at least three potential supervisors with exciting projects.

The Supervisory Relationship

This is a crucial relationship and will underpin the success of your research studies. The Learning Institute's Research Supervision website (http://www.learning.ox.ac.uk/supervision) is useful to DPhil students although it is also aimed at research supervisors. The EPSRC also provides advice on good supervisory practise on their website as an appendix to their Student Handbook (http://www.epsrc.ac.uk/)

8. Feedback, Monitoring and Assessment

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Assessment

Your work will be assessed at three levels: by continuous assessment and at termly meetings with a faculty advisor in year one; via termly reports from yourselves and your supervisor in years 2-4; and through formal milestones at 18 months and 36 months. Progression and milestones are described in section 9 of this document.

In your first year, you submit a report (towards the end of the second week of each module) and give a short presentation (on Friday of the second week, at Warwick) for each module. These are marked and given a single combined grade on a three-level scale by the module leaders: "Needs improvement", "Good" or "Excellent". Feedback is an important part of teaching and learning. The primary purpose of our assessment is to help you develop as an independent researcher. The module leader will give you more informal oral feedback on your report (later in the second week) and presentation (Friday of the second week). You can expect further oral feedback from your peers and other invited participants.

You will receive oral and written feedback on your two mini-projects, which will also be graded. All these grades from your first year will feed into your evaluation at your first programme milestone for transition to full doctoral status at each university at 18 months (see section 9).

Monitoring

There are other less formal milestones which are part of our progress monitoring. In your first year you will get advice and support from a senior DPhil student. In later years your supervisor fills this role. In your first year, each student will have a short end-of-term interview with the directors. In years 2-4, supervisors and students agree a termly report in two sections. This is reviewed by the CDT Directors, and by an independent departmental graduate tutor.

Feedback

There will be other formal and informal channels for you to feed back to the Directors, and their institutions, on your experience of the course. In the first year we will be asking you for regular feedback on how well we are doing. Termly monitoring reports are another conduit for feedback. Each term, students are encouraged to write a short report on their progress, including training, on the Graduate Supervision System (GSS) http://www.gss.ox.ac.uk/. GSS is open for student reporting in weeks 6 and 7 each term. From week 8 onwards each term, the supervisor is responsible for writing a report about the student on GSS. We will also ask you to fill in a feedback form at the end of Induction Week and at the end of each Module. This information will be fed back and used to improve the Programme and secure new students for the coming years.

CDT students are invited to elect a representative who can act as a link with the staff in the Department of Statistics, and in particular bring to light and discuss any general problems that might arise. The representative will be invited to attend the Graduate Liaison Committee which meets once a term. See

www.stats.ox.ac.uk/current_students/research_degrees/graduate_liaison_committee

9. Progression and Graduation

Progression and Graduation for Oxford-bound CDT students

During your first year you will be assessed in the same way as the Warwick-bound CDT students. At the end of your first year you will choose a supervisor at Oxford and continue at Oxford.

Your first important milestone is at approximately 18 months (before the end of the fifth term). It is called "Transfer of Status". New research students join the University as Probationer Research Student (PRS). You should apply to transfer to DPhil status **before the end of the fifth term from admission**. In order to pass this milestone you submit a report outlining the research you have done and what you plan to do for your thesis. You will have an interview with two assessors. The assessors put together all the assessment results available to date (the 8 module assessments, the projects and project assessments, the transfer report and any reports on transferable and broadening training) and give feedback to you and your assessor. This feedback will include an assessment of the viability and suitability of the proposed research, and of its completion on a reasonable timescale. Your assessors may recommend a range of possible outcomes, including transfer to the relevant lower degree, subject to the opportunity to make a further application.

Your second major milestone is at 36 months (before the end of the 9th term). It is called "Confirmation of Status". The purpose of confirmation of status is to check you are on track to submit within approximately 6 months. You should apply for confirmation of DPhil status **no later than the end of the ninth term from admission**. In order to pass this milestone you should submit a summary of your work to date (usually publications or draft chapters from your thesis) and a timetable for submission of your thesis. You will have an interview with two assessors. The assessors review your work and check that you have completed the necessary broadening and transferable-skills training and give feedback on your research. The feedback content is usually suggestions for further research or minor corrections. If a candidate's application for confirmation of status is unsuccessful, the board may approve a transfer from DPhil to MSc by Research status, subject to the opportunity to make a further application.

There are other milestones at the end of each term (approximately every 3 months) at which you and your supervisor give progress reports via an online system called GSS. For further information see section 8. These are reviewed by the CDT directors and the Director of Graduate Studies at Oxford. If for a short time you are unable to pursue your research, due to sickness or other exceptional circumstances you may apply for suspension of your student status. Time spent in this state does not count towards your next milestone deadline.

You are expected to submit your thesis within four years of full-time study. Your supervisor will consult with you on the appointment of examiners, and two examiners will be chosen. You will be examined on your thesis in a viva and then … watch out world!

For transfer confirmation, examination, extension of time, suspension of status and withdrawal please refer to the DPhil handbook: http://www.stats.ox.ac.uk/current_students/research_degrees.

Examination Procedures and Course Regulations
Information regarding the university's examination procedures can be found here:
http://www.ox.ac.uk/students/academic/exams

From the end of October regulations for the course will be available on the Oxford Examination Regulations website http://www.ox.ac.uk/students/academic/guidance/graduate/research or alternatively refer to your hard copy given to you during induction.

Progression and Graduation for Warwick-bound CDT students

18 month review

The second review takes place after 18 months and consists of a report, and about 3 weeks later, a meeting between the panel and the student. The report should be about 20-30 pages in length. The meeting is open to other members of staff, but not other postgraduate students. The meeting may be expected to take between one and two hours.

The primary purpose of this review is to enable the panel to make a recommendation to the Director of Postgraduate Studies as to whether you should be allowed to proceed on to the PhD programme. In making their recommendation the panel will take into account your performance during the first year of OxWaSP.

The 18 month review is key to considering if you are capable of successfully completing a PhD thesis, and whether it is in your best interests to be allowed to proceed.

24 month review

The third review takes place after 24 months. On this occasion you are asked to produce a research report, to give a thesis outline, and, in consultation with your supervisor, to give an estimated completion date. The report may be in the form of a research article (possibly jointly with the supervisor) or a thesis chapter, and should form a prototype for a paper in a good journal. The panel will provide written feedback to you, and a written recommendation to the Director of Postgraduate Studies.

30 month review

After 30 months, you should provide a signed overview of the thesis plan to the Director of Postgraduate Studies, together with a provisional submission date. Your supervisor should indicate their support by signing the document.

The Department expects that students will complete their study in a period of three to three and a half years. For those students who require more than three years the procedure is as follows.

36 month review (if necessary)

This stage must be completed by 36 months, and if requests for an extension or funding are required, then it is in your interests for this stage to be completed promptly. There are two possible processes depending on whether you plan to submit between 36 and 39 months, or later than 39 months.

Submission planned between 36 and 39 months

You should submit a revised thesis plan to the Director of Postgraduate Studies, with an intended submission date. Your supervisor should indicate their agreement.

Submission planned later than 39 months

In addition, a review takes place after 36 months. You should produce a thesis plan and a research report, and, in consultation with your supervisor, give an estimated submission date. Your supervisor should indicate their agreement to the proposed timetable. The research report may be in the form of a research article or a thesis chapter, and should be substantially different from the material given

after 24 months. About three weeks after the submission of the report the panel meets with you to discuss the research report and your progress. This meeting takes the form of a viva.

42 month review (if necessary)
If after 42 months you have not submitted then you should provide the Director of Postgraduate Studies with an overview of your thesis and a predicted submission date. Your supervisor should indicate their agreement, as before.

It is not possible to extend registration beyond 48 months. In exceptional circumstances (see University guidance) students are required to apply for temporary withdrawal and may do so within 48 months of registration.

The results of all reviews will be communicated to you by your supervisor, or a deputy appointed by the supervisor, as soon as possible after the review, and normally within one week of presentations and one month of the submission of written reports.

Time frame for reports and presentations over the course of 4 year PhD

Progress Review	Report Submitted	Presentation Date	Feedback
18 month	End of March	Mid-April - organised by student	Within 1 month
24 month	End of September	n/a	Within 1 month
30 month	End of March	n/a	Within 2 weeks
36 month	Beginning of October	Meeting with panellists arranged by student	Within 2 weeks
42 month	End of March	n/a	Within 2 weeks

Thesis examination
A research thesis is normally examined by two examiners, a member of the Department and an external examiner who is an expert in the particular topic. The external examiner is usually a senior member of staff from another university.

Your supervisor will submit an Examiner Nomination Form, via the Student Support Office, to the Graduate School who will then send you further instructions on submitting your thesis. The Internal Examiner will then communicate with the External and you supervisor to arrange a suitable date for the viva. **All correspondence with your examiners prior to the viva should be done via your supervisor.**

After reading the thesis the examiners will hold an oral examination where you will be asked questions about your work and about your wider knowledge of the subject. Award of the PhD follows a satisfactory report from the examiners.

Minor revisions to a PhD thesis may be required. Alternatively, the degree of
MPhil may be awarded instead of the PhD, or you may be required to resubmit the thesis with or without a further oral examination. Exceptionally, the examiners can decide not to award a degree.

Progress on the PhD programme
If at any stage in the review process the panel feels that you are failing to make adequate progress then they may recommend that you withdraw or write up for an MSc by Research or an MPhil. In such cases the Director of Postgraduate Studies, possibly in conjunction with Research Committee, will decide whether to allow you to progress. If the decision is not to allow you to progress then you are entitled to ask for a second review within 3 months. This is usually invoked automatically by the

Department by devising a 3 month action plan. If the panel and the Director of Postgraduate Studies remain of the opinion that you are not making adequate progress then you will be required to withdraw or write up for an MSc by Research or MPhil. At this stage you may appeal to the University, subject to the rules and regulations for such appeals.

10. Skills Learning

Transferable Skills Training
You will engage in at least 10 days of transferable skills training, per year and in fact we anticipate your spending rather more time than this. In the first year this is whole-cohort training in core transferable skills.

Skills Training in year one (Oxford based) and years two to four
You will need to ensure by the time you reach your Transfer of Status (18 months from the start of this program), you have spent a minimum of 10 days on transferable skills courses. Engagement with transferable skills training is a requirement of your Transfer of Status. You will be directed to transferable skills courses/opportunities and you will need to keep your own record throughout the year. Here are some engaging courses. The ones marked with a star are built into the programme.

Foundation Phase: 0-12 months	Intensive Research Phase: 12-30 months	Completion Phase 24+months	Anytime during the DPhil
*Finding Research Information			
Foundations for a Successful DPhil	Conferences: Choosing, Funding, Networking	Finish your DPhil	Academic English
Introduction to Research Data Management	GRAD Challenge	Viva preparation & practise	Communication Science
Managing your supervisory relationship	Making a Difference: Applying your Research		Introduction to Public Engagement
Narrative Skills	Poster Design & Presentation		Navigator for men (not 1st years)
Presentation Skills	Scientific Writing: Getting your paper published		Scientific Writing: core skills
*Research Integrity 23 November 2015 25 February 2016 3 June 2016	Teaching and Learning: Lab Demonstrators (PLTO)		Springboard for women (not 1st years)
	Teaching and Learning: Tutors & Class assistants (PLTO)		Thesis & report writing
	Teaching and Learning: Science not magic (DLT)		Translating your research into hands on activity

The following link will enable you to drill down further into what these courses are about and what you will be able to take away from them.
http://www.mpls.ox.ac.uk/training/course-programme-for-graduate-students/training-framework-for-dphil-students

http://www.mpls.ox.ac.uk/training/course-programme-for-graduate-students

By Michaelmas Term, week 4, we would like to see that you have mapped out your transferable skills training plan for your first year.

In years 2-4 you will be encouraged to choose courses of interest to you from a wide array of courses on offer in the two universities. You can further develop your transferable skills training through programmes at your respective universities. The MPLS Division also offers training to help you in

your journey to become a successful researcher:
https://weblearn.ox.ac.uk/portal/hierarchy/mpls/gap (can only be accessed once you have your university single sign and username).

Broadening Training

You will spend a minimum of 100 hours in training in mathematical and statistical methods outside your area in the course of your doctoral training. This is recorded and monitored at the key transition points in the degree. You can choose from a wide range (maybe hundreds) of courses available to you at your university. At Oxford this is centrally organized through the MPLS Graduate Academic Program (GAP) – please refer to the next page. Warwick students have similar freedom. 75 out of the 100 hours will be committed to APTS (next page).

Academy for PhD Training in Statistics (APTS)

The Academy for PhD Training in Statistics is collaboration between major UK statistics research groups to organise courses for first-year PhD students in statistics and applied probability nationally. The intention of APTS is to provide courses which will be attractive and relevant to the research preparation and background education of all statistics and probability PhD students in the UK.   APTS is open also to students from institutions outside the UK. You will gain a wide appreciation of other important statistical research themes through APTS, as well as enlarge your network of peer and senior research contacts. All CDT students are expected to attend as part of their fulfilment to the programme. The first three weeks of APTS are mandatory and you will be registered for these:

Week 1: Monday 14 – Friday 18 December 2015, Cambridge
Week 2: Monday 11 – Friday 15 April 2016. Nottingham
Week 3: Monday   4 - Friday 8 July 2016, Lancaster

The final week, Monday 22 August – Friday 26 August 2016, Glasgow is optional. You need to let the CDT administrator (Karyn McBride) know by **12 noon on Monday 26 October at the latest**, whether you will be applying for the final week. Please seek advice from your academic advisor and DPhil mentor. Each week is a pair of themed modules. You may not take individual modules: applications have to be for one or more whole APTS weeks. Applying for APTS weeks is a firm commitment to attend. Last minute cancellation of a place on an APTS week may cost several hundred pounds. More detail is available at the APTS website: http://www2.warwick.ac.uk/fac/sci/statistics/apts/

Industry Lunchtime Seminars i.e."pizza lunches"

Throughout the programme, you will be encouraged and empowered to develop an awareness of the critical importance of your doctoral training not only within the international development of statistical methodology and analysis but also its relevance to industry and society. You will therefore have the opportunity to invite industrial partners to attend and speak at our industry lunchtime seminars, which will take place every Wednesday of the second week of the module. You will have the assistance and knowledge of our second year OxWaSP students who you will co-lead with.

Graduate Academic Program (GAP)

The GAP system allows MPLS students to book places on graduate training courses run in departments across the division. CDT courses are among those listed and small numbers of graduate students from other departments regularly attend CDT modules on a one off basis.
Lists of available courses and instructions on booking can be found at

Departmental Graduate student poster presentations

In your second and third year you will be expected to present a poster at the departmental graduate poster session which takes place in late Hilary Term. This is an opportunity to showcase your research to other students and members of the faculty. This will be replaced by a talk to the wider department in your fourth year.

Seminars in Statistics

The Department of Statistics organises seminars in statistics on Thursdays during term at 2.15 pm. These seminars are held at 1 South Parks Road. Many speakers are distinguished researchers from Oxford and beyond. The seminars provide a useful opportunity to hear about current research problems in statistical theory and applications. Those attending normally continue discussion over tea and biscuits afterwards. Further information can be found at
http://www.stats.ox.ac.uk/news_and_events/weekly_seminars

Probability Workshops

Probability workshops take place every Monday 12:00 – 13:15 during term time in L4 at the Maths Instititute, Andrew Wiles Building, Radcliffe Observatory Quarter.
https://www.stats.ox.ac.uk/events/probability_workshops

Reading Group

Every Friday at 4pm, the research groups of Chris Holmes, Arnaud Doucet, Yee Whye Teh and Geoff Nicholls gather together to review, discuss and debate research papers on computational statistics. A more detailed schedule of papers and discussants is available on the department website.

Departmental Graduate Lectures

Students are also welcome to attend the Graduate Lectures at 3.45 pm on Thursdays: http://www.stats.ox.ac.uk/events/graduate_lectures. These lectures are aimed at research students. You expected to attend these lectures.

Teaching

You will be taught to teach. We see this as a fundamental part of training for an early career research worker and an opportunity for you to engage and be integrated into the life of your host department. Starting in the second year, you will teach in your host department. This will be approximately 12 contact hours (paid) per year. Warwick students will deliver half these hours in each of the first two terms. You may teach undergraduate or graduate courses. This is mentored teaching, beginning with marking, to reach a point where you are leading whole classes of 10 or 12 undergraduate students. You will have the support of a mentor and get written feedback at the end of each block of teaching.

Oxford based students wishing to take on additional paid college-based teaching should check with their supervisor before making any commitment.

Conference Attendance/Travel Funding

OxWaSP has generous provision for travel for research collaboration and training. Besides the weekly to and fro between Oxford and Warwick, we have funding for an annual workshop, an annual three-day retreat, the "Amazon Adventure" to Berlin in the second year, and the international exchange visit in third year. We have £1000 in EPSRC and MRC funding to support one or more conference trips for each student for the programme duration. Additional monies may be available from your college and from your Department. You should discuss conference travel and target submissions with your supervisor at some point in your second year.

Internships
You will have the opportunity to go on industrial placements and have joint supervision from industry. The Centre has a number of partners in industry, including some of the world's leading pharmaceutical, consumer, technology, and finance firms, who all point to a critical need for statisticians working on methodological techniques. You may have the opportunity to spend some time in your first year with one of these partners as part of your mini-project work. This will depend on the availability of joint projects, though you may have a hand in shaping these if you are keen. You should discuss your interests with potential supervisors. There will also be the potential to work on joint projects with our industrial partners for your doctorates.

11. Resources

Move to a new building
In early 2016, the Oxford Department of Statistics will be moving to a new home located on 24-29 St Giles, subject to refurbishment completion.

Computing
Students will be provided with a computer and desk space in a shared office. For the first year, this will be located in an office shared with other CDT students. When Oxford students begin their DPhil research, they move to an office shared with other DPhil students in their research group.
Students have access to the Department of Statistics computing facilities. Other courses, particularly those on high-level programming languages, which are provided by the University's IT Services in Banbury Road may be of interest to students http://www.oucs.ox.ac.uk/.

You should also make yourself aware of the following departmental documents:

Guide to Computing Services
Guidelines for Examining Users' Data
Security and Privacy of Files
Policy Statement on Computer Use, Monitoring and Surveillance.

These are available at
http://www.stats.ox.ac.uk/about_us/it_information/generalaccess/new_users_start_here
along with details of how to use your laptop on the Oxford Wireless LAN.

Libraries
The Department of Statistics has its own small library in 1 South Parks Road. Further details of the Statistics library facilities are to be found later in this handbook.
The University Card also serves as a library card and will allow access to the Radcliffe Science Library (RSL) in Parks Road, and also the Social Studies Library, Manor Road. A map can be found at http://www.ox.ac.uk/visitors/maps-and-directions/museums-libraries-and-places-of-interest.

The Physical Sciences Librarian with responsibility for the statistics collection in the RSL is Ljilja Ristic (email ljilja.ristic@bodley.ox.ac.uk). A specific training session for statistics research is held in Michaelmas Term. Nuffield College has a good selection of staff books which can be borrowed by statistics research students.

College libraries may also be useful although access is usually restricted to members of that college.

Links to the University's e-resources, including electronic journals can be found at
http://www.bodleian.ox.ac.uk/english/eresources

Process for borrowing a book

1.   **Admittance to the Library**
The library can be found on the first floor at 1 South Parks Road. All new readers must register with the Academic Administrator, (Room 1.101, email lib@stats.ox.ac.uk). A current University card is required for registering and for entry to the library.

2.   **To find a book**
Most of the departmental books and journals are catalogued on SOLO, the University's on-line catalogue. SOLO can be accessed through the library terminal.

The lending books are currently undergoing a process of re-shelving using Library of Congress classifications. Shelves have been marked accordingly.

The other library sections are as follows:
The books in each of the main sections are in alphabetical order of the surname of the first author or editor.

100.   White spine labels - Main statistics lending section
        Sections also on introductory statistics; history of statistics; and general study skills.

200.   Yellow - Probability and operational research

300.   Green - Genetics and Biology

400.   Orange - Mathematics and computation

700.   Gold - Reference only. These books may not be borrowed.

There is also a lending stack area in the farthest room. These books may be borrowed. Periodicals, dissertations and theses are for reference only.

3.   **To borrow a book**
Books are borrowed on a self-issue basis by scanning into the self-issue computer firstly the barcode from the reader's University card, and then the barcode sticker inside the front cover of the book to be borrowed.

Each book borrowed **must be recorded** on the self-issue computer in the library. The department is small and so is the library budget. Stolen books have to be replaced, reducing the budget for new books. Reference books, journals, dissertations and theses and any items without barcodes **cannot be borrowed**.

4. **To return a book**

Books should be left in the **returns box** in the library. If books are overdue then reminder notices will be sent out by email. If a book is reserved by another reader or needs to be recalled then a reader may receive a notice, again by email.

5. **To reserve a book**

Reservation requests can be made via SOLO, the University's library catalogue. Reserved books can be collected from room 1.101.

6. **Loan periods**

Research students can borrow books for four weeks and then can be renew them online unless recalled by the library.

Loans may be renewed either by using SOLO before the due date, by checking them out again, or by e-mailing lib@stats.ox.ac.uk

7. **Rules of conduct**

These rules apply to all library readers. Breaches of library rules may lead to suspension of borrowing privileges, fines or suspension from the use of the library.

- Every book borrowed must be recorded on the self-issue computer in the library. Books must be returned by the due date or renewed. Any book recalled by the library must be returned as soon as possible.

- No reader may have more than **nine** books in their possession.

- Returned books must be replaced in the returns box. A reader is responsible for a book until it is returned to the library.

- Replacement costs will be charged for lost, damaged or defaced books.

- Eating and drinking are **not permitted** in the library except for bottled water.

- Please be considerate to other users and keep noise to a minimum.

- The library computers **must not** be unplugged or switched off.

- Personal belongings should not be left unattended in the library at any time. Any such items will be removed. The Department will not be responsible for personal belongings which are stolen or damaged.

- The library door should be kept locked at all times. Only the Librarian or Academic Administrator may give access to non-members of the Department.

- Reference books and journals may only be removed for photocopying within the Department and must be returned immediately.

- Photocopies may only be made in compliance with copyright law. Details are displayed by the Departmental printers/photocopiers.

12. **Administrative Matters**

Programme Management

Management Committee
OxWaSP will be managed on a day-to-day basis by a management committee. The membership of this committee is as follows: Director (Prof Chris Holmes, Oxford), Co-director (Prof Jim Smith, Warwick), Programme Administrator (Karyn McBride), Director of Graduate Studies (Prof Gesine Reinert) and two academics from Warwick and two academics from Oxford.

External Advisory Board
Our External Advisory Board provides independent advice to the Management Committee to help it achieve its aims. This includes building links with industrial partners and maximising opportunities for international collaboration in training. Our members are:
Anthony Ledford (AHL)
Marc Kennedy (Food and Environment Research Agency FERA)
Andrew Rose (Lubrizol)
Chris Holmes (University of Oxford)
Chenlei Leng, acting Co-Director 2015/2016 on behalf of Jim Smith (University of Warwick)
Karyn McBride (University of Oxford)
Simon French (University of Warwick)
Barbel Finkenstadt (University of Warwick)
Geoff Nicholls (University of Oxford)
Byron Jones (Novartis)

Academic Terms
CDT terms for 2015-2016 are as follows:

Michaelmas	Sunday 11 October to Saturday 5 December 2015
Hilary	Sunday 17 January to Saturday 12 March 2016
Trinity	Sunday 24 April to Saturday 18 June 2016

The Michaelmas and Hilary terms are short and intense. Teaching will take place in the first two terms and you will be expected to work on your first and second mini-projects in the third term and over the summer. It is important to maintain a presence in the department and with your cohort as well as attend the various skills training and attend reading groups etc.

Timekeeping
We expect you to turn up to all your timetabled events 5 minutes prior to the lecture/event beginning. This is to ensure the start time is adhered to and as courtesy to the module leader/event organiser. Due to the demands of the teaching terms, all emails from the department should in general be answered within 24 hours to ensure a continuous system of communication.

Attendance
During the taught modules in the first year you are expected to attend the CDT from Monday - Friday. Days 1 – 2 and 8 - 10 inclusive, are predominantly teaching days. Days 3 – 7 inclusive typically require you to work on your project either individually or in teams.   This also includes all organised events: workshops, away days, mini-symposia, graduate seminars and poster presentations. If you need to

be away for some good reason, please ask a member of staff. It is important you let your module leader and the CDT administrator know if you are going to be absent at any point. Attendance is full time and this should be reflected in your hours ~ 40 hours a week.

Holidays

You should agree any days off in the working week (Monday-Friday) with your Module Leader or Supervisor, depending on the time of the year. As a minimum you should take 20 workdays leave in addition to bank holidays (8 days) and periods of fixed closure for the Department (at Christmas and Easter, 6 days in total). Note the APTS course Mon, 14 Dec – Fri, 18 Dec

Absence/Illness

If you are unable to attend the CDT due to illness or unforeseen circumstances, please you contact the Programme Administrator, Karyn McBride as soon as possible. We need to know your whereabouts as we have a duty of care.

Residence Requirements (Oxford)

For all information required minimum residence requirements regarding your DPhil, please click on this link
http://www.ox.ac.uk/admissions/graduate/why-oxford/living-oxford/accommodation#residency

Maternity/Paternity

If you are planning a family or pregnant, please visit Personnel Services on the Oxford university website regarding maternity and paternity entitlements:
Maternity:
http://www.admin.ox.ac.uk/personnel/staffinfo/academic/maternityleaveforacademicstaffandrelatedmatters/

Paternity: http://www.admin.ox.ac.uk/personnel/during/family/paternity/

Statement of Expectation for RCUK students

The Research Councils have released a single statement on how research organisations, students and their respective training environments must operate for all students funded by RCUK. Click on the link to read this provision:
http://www.rcuk.ac.uk/media/news/130617/

Academic Integrity and the avoidance of Plagiarism

Academic integrity
The University's code of practice concerning academic integrity in research is set out on the website at http://www.admin.ox.ac.uk/personnel/cops/researchintegrity/, and, while the code's principles relate specifically to the conduct of research, *all* graduate students are advised to make themselves aware of the document's contents.   The University code of practice on Public Interest Disclosure can be found at http://www.admin.ox.ac.uk/personnel/cops/pid/ .

Plagiarism
University Definition **– see** http://www.ox.ac.uk/students/academic/guidance/skills/plagiarism
Plagiarism is the copying or paraphrasing of other people's work or ideas into your own work without full acknowledgement. All published and unpublished material, whether in manuscript, printed or electronic form, is covered under this definition. Collusion is another form of plagiarism involving the unauthorised collaboration of students (or others) in a piece of work.

Cases of suspected plagiarism in assessed work are investigated under the disciplinary regulations concerning conduct in examinations. **Intentional or reckless plagiarism may incur severe penalties, including failure of your degree or expulsion from the university.**

Why does plagiarism matter?

It would be wrong to describe plagiarism as only a minor form of cheating, or as merely a matter of academic etiquette. On the contrary, it is important to understand that plagiarism is **a breach of academic integrity**. It is a principle of intellectual honesty that all members of the academic community should acknowledge their debt to the originators of the ideas, words, and data which form the basis for their own work. Passing off another's work as your own is not only poor scholarship, but also means that you have failed to complete the learning process. Deliberate plagiarism is unethical and can have serious consequences for your future career; it also undermines the standards of your institution and of the degrees it issues.

What forms can plagiarism take?

- **Verbatim quotation of other people's intellectual work without clear acknowledgement.** Quotations must always be identified as such by the use of either quotation marks or indentation, with adequate citation. It must always be apparent to the reader which parts is your own independent work and where you have drawn on someone else's ideas and language.

- **Paraphrasing the work of others by altering a few words and changing their order**, or by closely following the structure of their argument, is plagiarism because you are deriving your words and ideas from their work without giving due acknowledgement. Even if you include a reference to the original author in your own text you are still creating a misleading impression that the paraphrased wording is entirely your own. It is better to write a brief summary of the author's overall argument in your own words than to paraphrase particular sections of his or her writing. This will ensure you have a genuine grasp of the argument and will avoid the difficulty of paraphrasing without plagiarising. You must also properly attribute all material you derive from lectures.

- **Cutting and pasting from the Internet.** Information derived from the Internet must be adequately referenced and included in the bibliography. It is important to evaluate carefully all material found on the Internet, as it is less likely to have been through the same process of scholarly peer review as published sources.

- **Collusion.** This can involve unauthorised collaboration between students, failure to attribute assistance received, or failure to follow precisely regulations on group work projects. It is your responsibility to ensure that you are entirely clear about the extent of collaboration permitted, and which parts of the work must be your own.

- **Inaccurate citation**. It is important to cite correctly, according to the conventions of your discipline. Additionally, you should not include anything in a footnote or bibliography that you have not actually consulted. If you cannot gain access to a primary source you must make it

clear in your citation that your knowledge of the work has been derived from a secondary text (e.g. Bradshaw, D. *Title of book*, discussed in Wilson, E., *Title of book* (London, 2004), p. 189).

- **Failure to acknowledge.** You must clearly acknowledge all assistance which has contributed to the production of your work, such as advice from fellow students, laboratory technicians, and other external sources. This need not apply to the assistance provided by your tutor or supervisor, nor to ordinary proofreading, but it is necessary to acknowledge other guidance which leads to substantive changes of content or approach.

- **Professional agencies**. You should neither make use of professional agencies in the production of your work nor submit material which has been written for you. It is vital to your intellectual training and development that you should undertake the research process unaided.

- **Autoplagiarism**. You must not submit work for assessment which you have already submitted (partially or in full) to fulfil the requirements of another degree course or examination.

The necessity to reference applies not only to text, but also to other media, such as computer code, illustrations, graphs etc. It applies equally to published text drawn from books and journals, and to unpublished text, whether from lecture hand-outs, theses or other students' essays. You must also attribute text or other resources downloaded from web sites.

Cases of apparently deliberate plagiarism are taken extremely seriously, and where examiners suspect that this has occurred, they bring the matter to the attention of the Proctors. Your attention is drawn to the Proctors' and Assessor's Memorandum, Section 9.5, 'Conduct in Examinations' and in particular to sections 4 and 5 and the concluding paragraph of the section:

4   No candidate shall present for an examination as his or her own work any part or the substance of any part of another person's work.

5   In any written work (whether thesis, dissertation, essay, coursework, or written examinations) passages quoted or closely paraphrased from another person's work must be identified as quotations or paraphrases, and the source of the quoted or paraphrased material must be clearly acknowledged.

Although the University strongly encourages the use of electronic resources by students in their academic work, any attempt to draw on third-party material without proper attribution may well attract severe disciplinary sanctions.

13. Student Support

MPLS Division Postgraduate Research Student Handbook
http://www.mpls.ox.ac.uk/study/currentpostgraduates

College Advisors

Every graduate student at Oxford has a College Adviser, who is an academic member of his or her College, usually a Fellow.

The role of the College Adviser is additional and complementary to that provided in the student's department or faculty. The College Adviser is not expected to perform the role of the Department or Faculty Supervisor(s), or to be responsible for directing students' academic work. Rather, the intention is to provide a focal point for an individual student's relationship with the College, and general academic or pastoral advice and assistance throughout the student's course of study.

Welfare

Students are always welcome at any time to discuss their concerns with the Course Director, Co-Director, Programme Administrator and any other member of the department they feel comfortable with.
Support is also available via College Advisors and College Offices.

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Other sources of advice and help include:

Student Counselling Service   http://www.ox.ac.uk/students/welfare/counselling/
Oxford University Student Union   http://ousu.org/advice/life-welfare/supportservices/
Nightline   http://users.ox.ac.uk/%7Enightln/
Current information for students – health and welfare

http://www.ox.ac.uk/students/shw/

Harassment

The Departmental advisors on matters of harassment are Mrs Karyn McBride (room 1.306, 1 South Parks Road), tel 72875, email mcbride@stats/.ox.ac.uk or Dr Neil Laws (room 1.302, 1 South Parks Road), tel 72597, email laws@stats.ox.ac.uk. The University's *Policy on Harassment including Bullying* can be found at
http://www.admin.ox.ac.uk/eop/harassmentadvice/

Disability

The Disability contact is Mrs Jan Boylan (room 1.101, 1 SPR), tel. ext 72870, email

boylan@stats.ox.ac.uk . For University guidance and support please refer to
http://www.admin.ox.ac.uk/eop/disab/
http://www.ox.ac.uk/students/welfare/disability/

Childcare Services
Information on the University's childcare services can be found at
http:///www.admin.ox.ac.uk/childcare/

University policies
Access to University policies on a wide range of issues can be found via the Student Gateway at http://www.ox.ac.uk/current_students/index.html.

These policies include:
Equal Opportunity Policy for Students   http://www.admin.ox.ac.uk/eop/universityofoxfordequalitypolicy/
Race Equality Policy   http://www.admin.ox.ac.uk/eop/race/policy/
Code of conduct for using IT facilities   http://www.it.ox.ac.uk/rules

Financial matters
Information on fees and funding matters can be found at
http://www.ox.ac.uk/students/fees_funding_living_costs/
Information on hardship funding can be found at
http://www.ox.ac.uk/feesandfunding/graduates/targetedsupport/hardship
Information on the length of time given to pay your fees can be found at
http://www.ox.ac.uk/students/fees-funding/fees/liability
Information on continuation charges can be found here
http://www.ox.ac.uk/students/fees-funding/fees/liability/graduate-continuation-charge

The Careers Service
The University Careers Service can be found at 56 Banbury Road with a website at http://www.careers.ox.ac.uk/. It is a free service for all Oxford University students including postgraduates, and also for alumni. It provides one to one guidance, support and advice; information on occupations, vacancies and further study, feedback on CVs and application forms; and skills coaching for preparing for interviews and making applications.

The Careers Service also runs the University Internship Programme
http://www.careers.ox.ac.uk/internship-office-and-work-experience/the-internship-programme/.

University Language Centre
International students, whose first language is not English, are strongly advised to visit the University Language Centre to find out more about the courses on topics such as Academic Writing and Advanced Communication Skills which run during term time. These have a registration fee for graduate students. Details are available at http://www.lang.ox.ac.uk/courses/english.html .

Complaints and Appeals
Student complaints regarding any aspect of the first year training at Oxford or Warwick will be handled through the complaints system at Oxford. Complaint issues in later years will be handled by the student's host university. Discipline cases for year 1 students will be referred to Oxford. Oxford will share information with Warwick relating to such cases.

Oxford
http://www.stats.ox.ac.uk/__data/assets/pdf_file/0013/8302/complaints.pdf

Warwick Complaints and Appeals
http://www2.warwick.ac.uk/services/academicoffice/examinations/postgraduate
http://www2.warwick.ac.uk/services/aro/studentfeedbackandcomplaints

14. 1 & 2 South Parks Road

Access to the Department's Buildings

The Department's buildings at 1 and 2 South Parks Road (SPR) are accessible by the University card 24 hours a day, 7 days a week including bank holidays; administrative staff are on duty from 8.30 am to 5.30 pm (Monday to Thursday) and 8.30 am to 4.30 pm (Friday) (except from 1–2 pm Monday to Friday). **All occupants working in these buildings after 7 pm** or at any time on weekends or public holidays **must record their presence by signing the *In and Out* book** (found in 1 SPR by the pigeonholes in the foyer and in 2 SPR on top of the safe, underneath the stairs in the foyer).

Care of Buildings

As there is no caretaker for 1 and 2 SPR, we ask all users of the buildings to help with security. Please leave windows and doors secure; and follow the security notices posted in the buildings. Please report any infringements, lighting failures or problems needing the attention of the surveyors or cleaners, etc. to **buildings@stats.ox.ac.uk**.

Please do not switch off hall/stairway lighting at any time.
It is illegal to smoke in any of the buildings.
The lift in 1 SPR should not be used out of general office hours.

Keys

Keys for study rooms and offices are issued with the approval of the Head of Department. Access to the Statistics Library, the Computing rooms and the main Lecture Room are through the University card system. The keys are issued by the Administrative Assistant [Room 1.109].

Printing/Photocopying

Individual photocopying/printing accounts are set up by the IT staff. Access to the machines in the buildings is then available by means of your university card number. Academic use of photocopiers is free to all Departmental staff and research students (Copyright law applies. A comb binding machine is available on the second floor in 1 South Parks Road.

Post

Pigeonholes in the entrance hall of 1 South Parks Road are appropriately marked for incoming post, items outgoing by University Messenger or Royal Mail post and for Department Members. There are also general trays for those working in the Medawar or OCGF buildings.
University Messenger Service collects and delivers mail for the departments and colleges of the University.
Royal Mail is centrally collected and sent out by the administration staff each afternoon. Where Departmental business is not involved, you should make your own arrangements. Non-staff business items will be franked if approved by an academic member of staff.

Telephones

Currently, all telephones have access for internal University use, whilst others will have a combination of local, national or international access depending on where the phone is located. Should your telephone be unable to make a call, it is possible for the front office to make the call on your behalf and transfer the call to your extension.

Travel Insurance

Where students are travelling on University of Oxford business a University travel insurance scheme operates. Please consult Liz Pring [Room 1.208] before making travel bookings; application and risk assessment forms should be completed if insurance is required.

Kitchen facilities and Common Rooms

Facilities and provisions for making tea and coffee are available in the kitchen in both 1 and 2 South Parks Road. Tea and coffee are free. The fridges are kept stocked with milk, but otherwise are available for use for storage of small quantities of perishable food.   Please keep the kitchens tidy. If reheating food in the microwave in 1SPR, it would be appreciated if you would bear in mind that some smells may offend.

A Common Room is available next to the kitchen in 1 SPR and there is a daily newspaper available. Please do not remove newspapers from the Common Room. In 2 SPR, room 2.113 is available as a Common Room when it is not in use for meetings, as indicated on the door.

Please do not take food or drink into the Computer Labs or the Lecture Room.

Lost property

Items which have been found in 1 and 2 South Parks Road are lodged with the Administrative Assistant in 1.109. The items are disposed of at the end of each term.

Emergencies, Security and Safety

The safety officer is Dr Matthias Winkel.

Fire

Please read the blue fire-action notices posted in the buildings and familiarise yourself with the escape routes. If there is a fire emergency, immediately break the glass on the nearest fire alarm point and then call both Security Services (89999) and the Fire Brigade ((9)999). Operate extinguishers only if this does not put you at risk and otherwise vacate the building immediately.

On hearing the fire alarm ringing please leave the building immediately. **DO NOT** stop to pick up your belongings. If you are the last person to leave the room please close the door. The assembly points are outside 1 South Parks Road if the fire is in 2 South Parks Road and 2 South Parks Road if the fire is in no 1. Do not re-enter the building until told by someone in authority that it is safe to do so. Someone in authority means either the Head of Department, the Administrator or the Health & Safety Officer or in their absence a fire officer.

Security

Theft of personal items does occur from time to time. It is important to remain aware of this and help maintain the security of the buildings. The entrance doors, library door and computer room doors should remain locked at all times. All windows should be closed and latched outside normal working hours. Security blinds in the Lecture Room and Common Room should be locked outside normal working hours. Personal belongings should not be left unattended at any time.

The University Security Service can be reached by phone on 89999.

First Aid

lists of qualified First Aiders are posted in the entrance hall to each building and First Aid Kits are in the kitchens of 1 and 2 South Parks Road. Out of hours, please phone 89999 for first aid assistance. For an ambulance phone (9)999.

Fires, security alerts and serious accidents must be reported to the Administrator and the scene of report must remain undisturbed. Safety information is filed in the Administrator's room and the latest Departmental reports are on the notice board in 1 SPR.

Access to the OCGF

The OCGF building is accessible using a University card 24 hours a day, 7 days a week including bank holidays. During office hours, access is through the front door of the building using your university card and a unique PIN code. If your card is not working you can also be gained via the Dept. of Physiology, Anatomy & Genetics main entrance. Maddy Mitchell is responsible for administrative duties in the building. She is based in 1 SPR (Room 303) and can be contacted at mitchell@stats.ox.ac.uk and 282857.

Care of Buildings
The building manager in OCGF is Philip.thornton-evison@dpag.ox.ac.uk .

Keys
A PIN code is required in order to use the University Card. Card details must be given to Maddy Mitchell who then requests the PIN from the building manager. Office keys are issued by Maddy.

Printing/Photocopying
A Canon photocopier can be found on the 3rd floor outside Room 40.08. There is also a small black and white printer on the second floor.

Post
All mail for this building should be addressed to 1 South Parks Road. It is then taken over by an administrative member of staff to OCGF and distributed to colleagues. There is a mail tray outside 40.08 where internal/external post can be deposited. It is then brought over to 1 SPR for franking and posting.

Kitchen facilities and Common Rooms
Facilities and provisions for making tea and coffee are available outside 40.08. Tea and coffee are free. There is a small fridge stocked with milk (which should be used solely for drinks) but is available for use for storage of small quantities of perishable food. The OCGF has use of a dishwasher. A Common Room is available on the third floor of OCGF and there is a daily newspaper available.

Emergencies, Security and Safety
The safety officer is Mr Philip Thornton-Evison.
On arrival, new staff, students and long-term visitors *must* have an induction to the building.

Access to the MEDAWAR

The Peter Medawar is a secure building requiring key fob access. As well as a contingency of approx. 50 Department of Statistics staff and students, the building houses an inter-disciplinary research consortium which investigates pathogen diversity through a combination of experimental and theoretical approaches. Key fobs are allocated after completing a fifteen minute safety induction of the building. 24/7 access to the building is available although the administrator should be notified of your intention to work over the weekend. Administrative cover in the Medawar is week daily from 9 a.m. – 5.00 p.m. except Wednesdays which is from 12.30 p.m. – 4.30 p.m.

15. Travelling to Oxford

Direct Coach from Heathrow/Gatwick

You can take a direct coach from Heathrow/Gatwick Airports by going to the main coach station or bus stop at your terminal. Ask the airport information desk to direct you. The Oxford Bus Company offer ('Oxford Airline') frequent services direct to Oxford city centre ('Gloucester Green Coach Station'). Journey time is 2 / 2.5 hours (approximately between £25/£35) respectively depending on traffic. We would advise on taking cash for the coach. This is a 20 minute walk from the Department.

A rather less frequent service connects with Birmingham International airports. There are connections with many other parts of the country, including a direct service to Cambridge.

By Train

There are frequent direct trains from London Paddington and regular links northwards via Birmingham, southwards via Reading, and westwards via Didcot. Railtrack's online timetable is available **here**.

By Car

The city centre is best avoided by approaching the Department from the north on the A4165 Banbury Road or A4144 Woodstock Road, both of which are accessible from the ring road. If using the M40 from the north leave at Junction 9, but from the south-east leave at Junction 8. However, on-road parking near the Department is near impossible.
How to get to the venue by car: http://www.rac.co.uk/plan-a-trip/

For other Travel and Transport information:
British Airports Authority (BAA)
Operators for Heathrow and Gatwick airports
http://www.baa.com

Rickshaws instead of Taxis!

Oxford has its very own green mode of transport! Cycle rickshaws are available to transfer you in and around Oxford. We would advise to book a second rickshaw for your luggage just in case you want more room. Make sure you book in advance to guarantee your rickshaw. Email address is: info@oxoncarts.com. Telephone: 00 44 7747024600. Please mention the Department if you decide to book. Details of this can be found on www.oxoncarts.com

Department of Statistics	Tel: +44 1865 272860 (reception)
University of Oxford	Fax: +44 1865 272595
1 South Parks Road	Departmental web-site: http://www.stats.ox.ac.uk/
Oxford OX1 3TG	

Emergency telephone numbers (from any phone) are:

UNIVERSITY SECURITY SERVICES: **89999**
FIRE BRIGADE, AMBULANCE SERVICE, POLICE: **(9) 999**

MODULE TIMETABLE 2015-2016

Term	Week (s)	Date	Module (M 1-8)	Module Leader	Practise based research skills LEARNING
MICHAELMAS TERM	0	5 Oct - 9 Oct	Induction Week		
		Fri 9 Oct	Oxford/Warwick Annual Workshop		
	1 – 2	12 Oct - 23 Oct	Computational Statistics and statistical computing (M1)	Krzystof Latuszynski | Lawrence Murray	
	3 – 4	26 Oct - 6 Nov	Probability & Approximation (M2)	Wilfrid Kendall | Christina Goldschmidt & Judith Rousseau	
	5 – 6	9 Nov - 20 Nov	Stochastic Simulation (M3)	Arnaud Doucet | Anthony Lee	
	7 – 8	23 Nov - 4 Dec	Scalable Methods & analysis of large complex data (M4)	Louis Aslett | Chenlei Leng	
	9	7 Dec - 11 Dec	*****PREP FOR APTS		*****PREP FOR APTS
		Fri 11 Dec	1st mini-projects list published		
	10	14 Dec - 18 Dec	APTS: WEEK 1		APTS: WEEK 1 - CAMBRIDGE
HILARY TERM	0	11 Jan - 15 Jan			
	1 – 2	18 Jan - 29 Jan	Machine Learning (M5)	Yee Whye Teh | Ben Graham	
	3 – 4	1 Feb - 12 Feb	Bayesian Analysis (M6)	Christian Robert | Chris Holmes	
	5 – 6	15 Feb - 26 Feb	Applied Statistics (M7)	Chris Holmes | Mark Fiecas	
	7 – 8	29 Feb – 11 Mar	Times Series & Stochastic processes (M8)	Barbel Finkenstädt | François Caron	
	9	Mon 14 Mar	Hand in 1st mini-project title choices		
		Fri 18 Mar	2nd mini-projects list published		
		21 Mar - 25 Mar	Start 1st mini-project		

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Term	Week (s)	Date	Module (M 1-8)		Practise based research skills LEARNING
	-2	4 Apr – 8 Apr	*****PREP FOR APTS		*****PREP FOR APTS
	-1	11 Apr – 15 Apr	APTS: WEEK 2		APTS: WEEK 2 - NOTTINGHAM
TRINITY TERM	0	18 Apr – 22 Apr	Mini-Project Work		
	1	25 Apr – 29 Apr	Mini-Project Work		
	2	2 May - 6 May	Mini-Project Work		
		Mon 2 May	May Bank Holiday		
	3	9 May -13 May	Mini-Project Work		
	4	16 May –20 May	Mini-Project Work		
	5	23 May –27 May	Mini-Project Work		
		Tues 24 May	Hand in 2nd mini-project title choices		
		Mon 30 May	May Bank Holiday		
	6	30 May - 3 Jun	Mini-Project Work		
	7	6 Jun - 10 Jun	Mini-Project Work		
		Fri 10 Jun	Hand in 1st mini-project		
	8	13 Jun – 17 Jun	Mini-Project Work		
		Mon 13 Jun	Start 2nd mini-project		
		20 Jun – 24 June	*****PREP FOR APTS		*****PREP FOR APTS
		27 Jun – 1 Jul	APTS: WEEK 3		APTS: WEEK 3 - LANCASTER
		TBA	CUDA		
		Fri 12 Aug	Formal notification of supervisor and DPhil project title to Chris Holmes		
		15 Aug – 19 Aug	*****PREP FOR APTS		*****PREP FOR APTS
		22 Aug - 26 Aug	APTS: WEEK 4		APTS: WEEK 4 - GLASGOW
		Wed 14 Sept	Hand in 2nd mini-project		
		Wed 14 – Thurs 15	OxWaSP Retreat TBA		Location TBA

Notes Page