Papers for APTS Advisory Committee Meeting AC6

13th September, 2012

- Report for item 2.2.3: APTS Alumni Questionnaire Summary (2007/08 Cohort)
- Report for item 3: APTS 2011/12
- Registration information for 2012/13
- Billing and Cancellation policy
- Paper from Tim Davis for item 4.2.
- Paper from Jonathan Rougier for item 4.3.
- Current Statistical Inference syllabus for item 4.3.
- Written contributions received from:
  - David Elston (BioSS)
  - Jonathan Rougier (Bristol)
  - Dave Woods (Southampton)
  - Shuaiwei Zhou (Student Representative; TCD)

Alumni Questionnaire: Preliminary Summary

Alumni of the 2007/08 APTS weeks were contacted via email where possible and via academic contacts at sending institutions in some others instances and asked to complete an online questionnaire (available at: `http://www2.warwick.ac.uk/fac/sci/statistics/apts/alumniquestionnaire`)

Thus far we have had 28 responses which are summarised on the following page.

Table Notes

Those who answered "other" to question 1 provided the following details:

- Lecturer in statistics in a University
- Looking for a position
- Research fellow
- Studying for a part time PhD and working as a statistical scientist for the European Commission

The "other" response to question 6 was accompanied by "A great opportunity to be taught at post grad level rather than reading books - which always takes longer for things to sink in."

Simple summary

Question	Response	Number
1. What best describes your current status?	still studying for PhD	6
	working in industry as statistical scientist	2
	working in industry in another role	
	working in academia as statistical scientist	16
	working in academia in another role	1
	other (please specify)	3
2. Which of the APTS weeks did you attend in 2007-08? (specify as many as is appropriate)	Statistical Computing & Statistical Inference	20
	Statistical Modelling & Statistical Asymptotics	23
	Applied Stochastic Processes & Computer Intensive Statistics	21
	Spatial and Longitudinal Data Analysis & Nonparametric Smoothing	20
3. Which of the APTS modules ended up connected closely to your eventual PhD research? (specify as many as is appropriate)	Statistical Computing	12
	Statistical Inference	10
	Statistical Modelling	13
	Statistical Asymptotics	3
	Applied Stochastic Processes	5
	Computer Intensive Statistics	13
	Spatial and Longitudinal Data Analysis	6
	Nonparametric Smoothing	7
4. Has the training given by APTS proved helpful to you in your PhD experience and research?	Yes	26
	No	2
5. Has the training given by APTS proved helpful to you in your present employment? (answer only if you are not still working for your PhD)	Yes	19
	No	3
6. If your answer to either of the previous two questions was yes, which of the following reasons underlie your recommendation? (specify as many as is appropriate)	The modules provide a broad general training in the area	24
	APTS weeks enable networking with peers	20
	APTS weeks enable broader contacts with more senior academics	9
	Other (please specify)	1
7. Which of the APTS modules ended up connected closely to your current employment? (specify as many as is appropriate, answer only if you are not still working for your PhD)	Statistical Computing	9
	Statistical Inference	12
	Statistical Modelling	16
	Statistical Asymptotics	5
	Applied Stochastic Processes	5
	Computer Intensive Statistics	11
	Spatial and Longitudinal Data Analysis	8
	Nonparametric Smoothing	7
8. Would you recommend APTS to someone just starting a PhD in applied probability or statistics?	Yes	26
	No	2

Paper for 3. APTS year 5 (2011–12): Summary report to Advisory Committee

Preliminary: some summary counts for all five years 2007–2012

Numbers of students who took at least one APTS week (of which, EPSRC-funded in brackets):

2007-2008	2008-2009	2009-2010	2010-2011	2011-2012
88 (38)	88 (37)	100 (45)	90 (37)	125 (46)

Number of APTS lecturers to date: 15. (This will increase to 17 in 2012–13).

Number of APTS-week host institutions to date: 9.

Member Institutions

In 2011-12 there were 29 MIs, all located in the UK and Ireland.

APTS weeks, academic year 2011–12

Week 1, January 2011, Cambridge:

- *Statistical Computing* (S N Wood)
- *Statistical Inference* (D Firth)
- Evening sessions:
  - *RSS Reception*
  - *Pub Quiz*

Week 2, April 2012, Nottingham:

- *Statistical Modelling* (J J Forster & D Woods)
- *Statistical Asymptotics* (A Wood)
- Evening sessions:
  - *RSS Reception*

Week 3, July 2012, Warwick

- *Applied Stochastic Processes* (S B Connor and C A Goldschmidt)
- *Computer Intensive Statistics* (B D Ripley)
- Special lecture: Prof. Sir. David Cox
- Evening sessions:
  - *RSS Reception*
  - *Statistics at Large* a presentation by statisticians
  - *Trip to Kennilworth* pub trip organised by PhD students

Week 4, September 2012, Glasgow:

- *Spatial and Longitudinal Data Analysis* (P J Diggle)
- *Nonparametric Smoothing* (R J Samworth)
- Evening sessions:

– *RSS Reception*

– *Pub Quiz*

– *Ceilidh*

Registrations

A total of 128 unique students were registered to attend one or more APTS week. Numbers of registrations for each of the four weeks were 96, 81, 96 and 84, respectively whilst corresponding attendance figures were 92, 74, 85 and 66, respectively. This year we were able to accommodate all registered students.

Of those 129 students:

- 56 were registered to attend all 4 weeks and 40 students actually did so.
- 121 were first year students in statistics or probability, of whom 47 were EPSRC funded.
- APTS Member Institutions supplied 112 of the 128 applications.

Student feedback

The following summarizes student responses to an anonymous questionnaire completed at the end of each training week.

A. Preparation for APTS

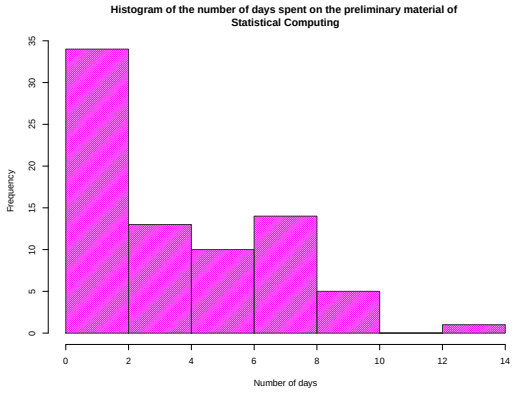
1. Did you find the APTS web site useful?

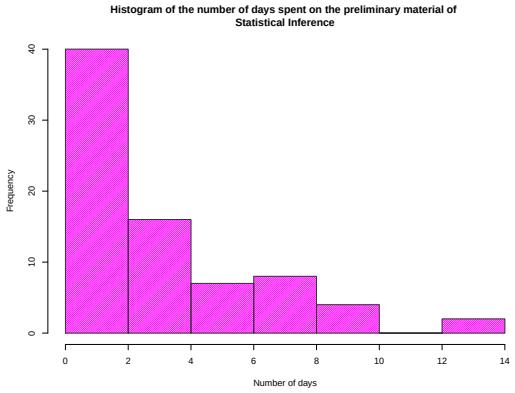
	Yes	No	Didn't use
Week 1	81	0	3
Week 2	62	0	0
Week 3	43	1	0
Week 4	31	0	1

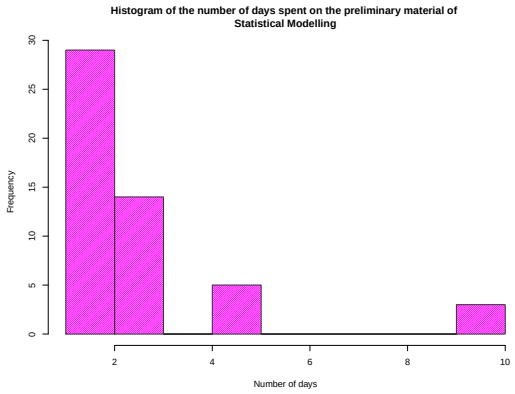
2. Was it clear exactly what was expected of you in the weeks leading up to this APTS week? (e.g., making travel arrangements, looking at preliminary material, registering your meal choice, etc.)

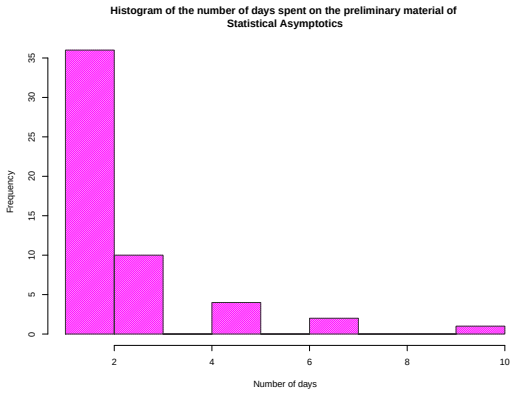
	Yes	No
Week 1	83	1
Week 2	62	0
Week 3	44	0
Week 4	32	2

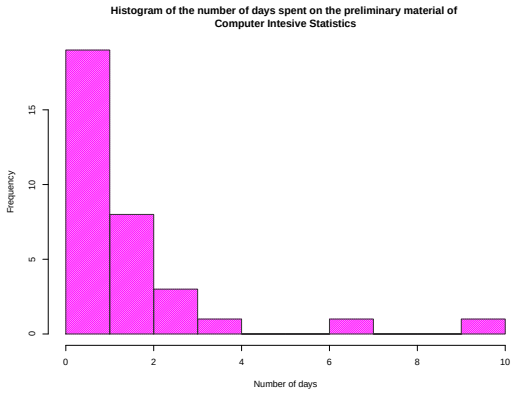
3. Roughly, how many days did you spend on the preliminary material?

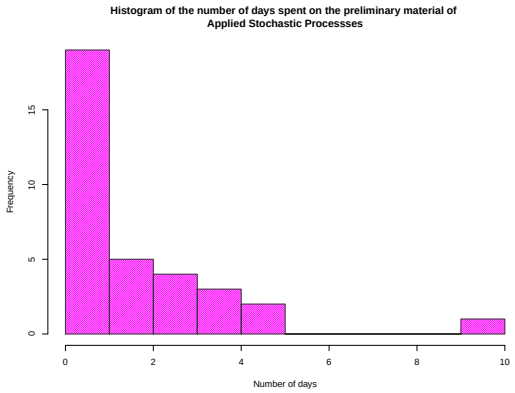


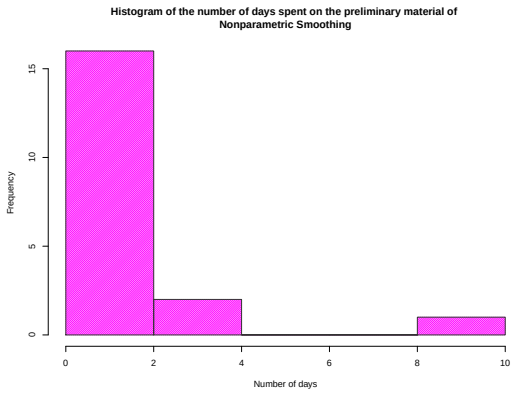


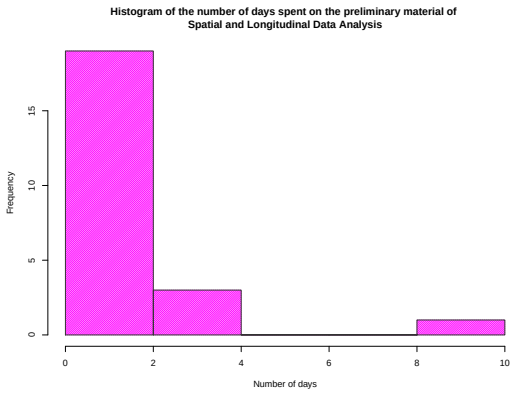












4. Did the preliminary material help you to understand the lectures this week?

	Yes	No	Didn't use
Statistical Computing	75	3	6
Statistical Inference	78	1	5
Statistical Asymptotics	40	8	14
Statistical Modelling	48	2	12
Stochastic Processes	32	1	10
Computer Intensive	28	4	11
Nonparametric Smoothing	12	6	17
Spatial and Longitudinal	20	2	13

B. The APTS week: material covered

1. How would you rate the level of the module lectures?

	Too easy	Just right	Too hard
Statistical Computing	3	67	11
Statistical Inference	6	67	7
Statistical Asymptotics	1	23	35
Statistical Modelling	1	58	1
Stochastic Processes	1	35	8
Computer Intensive	2	37	5
Nonparametric Smoothing	0	20	14
Spatial and Longitudinal	0	30	4

2. Did the Oxford R lectures help you with the computer sessions during the week?

	Yes	No	Didn't use
Week 1	44	3	34
Week 2	14	6	40
Week 3	9	4	29
Week 4	5	1	24

3. Did you find the computer sessions helpful?

	Yes	No	Didn't attend
Statistical Computing	66	10	4
Statistical Modelling	54	3	2
Computer Intensive	31	8	3
Nonparametric Smoothing	26	6	2

Student costs

The following table summarizes, in aggregate form (£), the invoices received by APTS sending institutions for the four APTS weeks in 2011–12:

	Registration fees	Accommodation and food	EPSRC travel allowance
Cambridge	£11,160	£22,320	(£1,001)
Nottingham	£9,600	£19,490	(£1,001)
Warwick	£11,280	£21,640	(£0,985)
Glasgow	£6,000	£18,700	(£1,004)
TOTAL	£38,040	£82,150	(£3,991)

Notes:

Registration fee discounts for students attending all four weeks are all deducted from the final week.

Registration for APTS

Student registration for APTS academic year 2012-13 will open on Friday 21st September 2012, and **closes at noon on Friday 26th October 2012**. Registration applications made after that date will be kept in a priority-ordered reserve list, in case of any cancellations.

Students can only be registered for APTS weeks by their "sending institution" (i.e., their home department): a list of these institutions appears below.

- If your department wishes to register as a sending institution, then please click here;
- If your department wishes to commit to being a full Member Institution of APTS, then please click here.
  (All Member Institutions are automatically "sending institutions".)

If your department is included in the list below, the APTS contact (who must be a member of academic staff employed by that institution) will be provided with a password enabling him/her to complete the student registration form for 2011-12 APTS weeks. (The student registration form also gives full information on cost.)

The principles and practicalities of student registration and payments include:

- date of application within the registration period is unimportant --- it is not used in determining the allocation of APTS places to students (see the APTS Constitution for the list of priorities)
- sending institutions are invoiced by APTS for the registration fee, and for accommodation/meal costs, of their students who are allocated APTS places
- for EPSRC-funded students taking an APTS week away from home, an allowance is made by APTS to the sending institution towards the cost of travel
- in the case of a student taking all four APTS weeks in the same academic year a 20% rebate of registration fees is made
- all financial transactions with individual APTS students, including those relating to travel expenses, are handled by the sending institution

Please see the FAQ and the Billing and Cancellation policy for more specific information.

List of sending institutions

	APTS contact
University of **Aberdeen**: School of Medical Sciences	Ian Stansfield
Aston University: Mathematics Group	David Saad
University of **Bath**: Department of Mathematical Sciences	Simon Wood
Queens University **Belfast**: Department of Sustainability	Frank Figge
University of **Birmingham**: School of Mathematics	Biman Chakraborty
University of **Bristol**: Department of Mathematics, Statistics Group	Jonty Rougier
University of **Bristol**: Department of Social Medicine	Chris Metcalfe
University of **Cambridge**: CRI	Simon Tavaré

University of **Cambridge**: Statistical Laboratory	Susan Pitts
University of **Cambridge**: MRC Biostatistics Unit	Angela Talbot
Cardiff University: School of Mathematics	Anatoly Zhigljavsky
University College **Cork**: Statistics Department	David Hawe
Trinity College **Dublin**: Statistics Group	Simon Wilson
University College **Dublin**: Statistics Group	Brendan Murphy
Durham University: Department of Mathematical Sciences	Jochen Einbeck
University of **East Anglia**: Department of Economics	Peter Moffatt
University of **East Anglia**: Department of Computer Science	Elena Kulinskaya
University of **Edinburgh**: Roslin Institute	Mark Bronsvoort
University of **Edinburgh**: School of Mathematics	Natalia Bochkina
University of **Essex**: Department of Mathematical Sciences	Berthold Lausen
University of **Exeter**: College of Engineering Mathematics and Physical Sciences	Chris Ferro
National University of Ireland, **Galway**: Department of Mathematics	John Newell
University of **Glasgow**: Statistics	Adrian Bowman
Government Communications HQ	Jeremy Bradley
Heriot-Watt University: Department of Actuarial Mathematics and Statistics	George Streftaris
University of **Iceland**: Department of Mathematics	Gunnar Stefansson
University of **Kent**: Institute of Mathematics, Statistics and Actuarial Science	Lothar Breuer
Lancaster University: Department of Mathematics and Statistics	Kanchan Mukherjee
Lancaster University: School of Health and Medicine	Peter Diggle
University of **Leeds**: Department of Statistics	Leonid Bogachev
University of **Limerick**: Department of Mathematics and Statistics	Gilbert MacKenzie
University of **Liverpool**: Centre for Medical Statistics and Health Evaluation	Marta García-Fiñana
University of **Liverpool**: Department of Molecular and Clinical Cancer Medicine	Trevor Cox
University of **Liverpool**: Department of Mathematical Sciences	Damian Clancy
London School of Hygiene and Tropical Medicine	James Carpenter
King's College **London**: Department of Statistical Science	Andrew Pickles
University College **London**: Department of Statistical Science	Afzal Siddiqui
University College **London**: Department of Infection and Population Health	Andrew Copas
University College **London**: Institute of Child Health	Mario Cortina-Borja
University of **Manchester**: School of Mathematics	Peter Foster
National University of Ireland, **Maynooth**: Department of Mathematics	Caroline Brophy
Newcastle University: Department of Mathematics & Statistics	Colin Gillespie
University of **Nottingham**: School of Mathematical Sciences	Chris Brignell
Open University: Department of Mathematics & Statistics	Kevin McConway
University of **Oxford**: Department of Physics	Nick Jones
University of **Oxford**: Department of Statistics	Jonathan Marchini
University of **Oxford**: Wellcome Trust Centre for Human Genetics	Gil McVean
University of **Plymouth**: School of Computing and Mathematics	Julian Stander
University of **Reading**: Quantitative Biology and Applied Statistics	Fazil Baksh
University of **St Andrews**: School of Mathematics and Statistics	Carl Donovan
University of **Salford**: Centre for OR and Applied Statistics	Phil Scarf

University of **Sheffield**: Department of Probability and Statistics	Caitlin Buck
University of **Sheffield**: School of Health and Related Research	Stephen Walters
University of **Southampton**: School of Mathematics	Robin Mitra
University of **Southampton**: School of Social Sciences	Peter Smith
University of **Surrey**: Department of Mathematics	Janet Godolphin
University of **Warwick**: Complexity Science DTC	Stefan Grosskinsky
University of **Warwick**: Department of Statistics	David Hobson
University of **Warwick**: MASDOC Doctoral Training Centre	Christoph Ortner
University of **Warwick**: Medical School	Nigel Stallard
University of **Warwick**: Systems Biology Doctoral Training Centre	Vicky Buchanan-Wollaston
University of **Wolverhampton**: School of Technology	Diwei Zhou
University of **York**: Department of Mathematics	Stephen Connor

apts.ac.uk

• Contact APTS •

Intranet
Contact APTS

Page contact: David Firth

Last revised: Wed 12 Sep 2012

Billing and cancellation

This page gives details of the way in which the accounts of sending institutions will be handled, and of the APTS cancellation policy.

Billing

APTS will maintain an account for each sending institution. Charges made against this account will be:

- registration fee for all students
- cost of the specified accommodation and food requirements

For students who participate in all four APTS weeks in the same academic year, 20% of registration fees will be rebated.

Invoices will be issued to sending institutions **at the end of each APTS week**, for the amounts relating to participation in that APTS week. Registration rebates for students attending all four weeks are made on the invoice for APTS week 4.

Cancellation policy

A statement of this policy will appear also on the form that is signed by sending institutions, to confirm their accepted registrations for APTS, immediately after the closing date for registering students.

1. Registration fees are payable for all students accepted for an APTS week, and are not normally refunded in the event of cancellation.
2. In the event of cancellation of a student's participation in an APTS week, the charges made for accommodation and food will be reduced by
    - **100%** if the cancellation is received **before noon of the Monday six weeks prior to the Monday of APTS week**
    - **50%** if the cancellation is received after that but **before noon of the Monday four weeks prior to the Monday of APTS week.**

    (For an APTS week starting on Tuesday or Wednesday, "the Monday of APTS week" means the preceding Monday.) After four weeks prior to an APTS week, charges relating to that APTS week are not normally refunded.

Notice of any cancellation should be sent (by the APTS Academic Contact for the student's home department, NOT by the student concerned) by email to admin@apts.ac.uk.

Paper for 4.2 — The Scientific Method, Data Collection and Quality Control

The Scientific Method, Data Collection and Quality Control

The science of statistics is more than just developing mathematical tools to model data. Inference is (usually) based on either deductive logic [Pr(D|H)] or inductive logic [Pr(H|D)] – see Gauch (2003). In an important paper, Box (1976) illustrated how statistical science provided the catalyst for scientists to iterate between these two inferential states. Davis (2006) provided a modification, emphasising that this process needed to converge to a point where analysis and inference together create an action to force a change to the current state.

Of course, at the heart of our subject is data. The moment when an observation is transformed into data must have integrity, and this part of our subject is, arguably, neglected (Heinzen and Nolan, 2012). It is my view that if we want to be statistical scientists, we should be close to the collection of the data upon which we choose to base our inference. Chapter 4 in the recent book by Cox and Donnelly (2011) provides a useful discussion of the issues.

Tim Davis
September 11, 2012

Box, GEP. "Science and statistics". *Journal of the American Statistical Association*, Vol. 71, No 356, 1976, pp 791-799.

Cox, DR, and Donnelly CA. *Principles of applied statistics*, CUP, 2011.

Davis, TP. “Science, engineering, and statistics”. *Applied Stochastic Models in Business and Industry*, Vol. 22, Issue 5-6, pp 401-430.

Gauch, HG. Jr. *Scientific method in practice*. CUP, 2003.

Heinzen, TE & Nolan,S. Letter to the editor, *RSS News*, September 2012.

Paper for 4.3 — Statistical Inference: Proposed Syllabus

Received from Jonathan Rougier:

I am attaching a syllabus which I hope you can knock into shape and submit for the thoughts of the committee. I appreciate that they could probably do with a lot more information. So perhaps you could also inform the Advisory Committee that:

1. I will be working with a finite sample space, for simplicity (and realism!). The parameter space will in general be a convex subset of R^p.

2. The first lectures will cover aleatory vs epistemic interpretations of probability (eg history according to Hacking), why it is that the statistical model might be the same in the two cases (random sampling and exchangeability), and why it is that the numbers that emerge are often similar (asymptotic argument and KL divergence).

3. I will not be proposing to interpret Bayes Factors on the Jeffreys/ Good scale, but rather seeing them more as a pragmatic device that may obviate the need for a careful assessment of the prior probabilities of the hypotheses. Hence the emphasis on bounds, which may also obviate the need for a careful assessment of Pr(theta | H_1). This material goes back to Edwards, Lindman and Savage; it has been picked up in medical statistics by Goodman.

4. I'll prove that P-values are sub-uniform under H_0 in a handout (I have not seen a proof of this, but it is true!). In the lecture I'll just prove that they are uniform for continuous X and simple H_0. This is enough to understand why small P-values may weaken H_0 but large values cannot support it. I'll use David Cox's construction (from Savage et al, 1962) to link significance tests and UMP hypothesis tests via the one-parameter exponential family. This then ties back to bounds on Bayes factors in a very neat way.

5. No sufficiency (too specific for a general inference course). Hence a slightly stronger Weak Conditionality Principle is used to achieve equivalence with the Likelihood Principle. LP implies that one should condition on experimental ancillary values (eg X in regression, random N, missing at random data), the stopping principle will be explained through 'significance hunting', also known as 'researcher degrees of freedom'.

The proposed syllabus is:

Statistical Inference

Module leader: J.C. Rougier

Aims: To examine different statistical approaches for evaluating the evidential support for or against hypotheses, both the tools (e.g. P-values, Bayes factors), and the principles.

Learning outcomes: Familiarity with different approaches to statistical reasoning, and a clear understanding of what can and cannot be inferred from each approach. After taking the module, students should be able to recognise and avoid the common inferential fallacies: the Prosecutor's fallacy, the base rate fallacy, and the P-value fallacy.

Prerequisites: Preliminary reading material will cover: the probability calculus, conditional probability, Bayes's theorem, convergence in probability and the Weak Law of Large Numbers; maximum likelihood (ML) estimation, confidence sets; significance tests (i.e. tests of goodness of fit), hypothesis tests, the Neyman-Pearson Lemma, uniformly most powerful (UMP) tests; Bayesian estimation, prediction, and hypothesis testing. Some of these will be revisited over the course of the module. Familiarity with R will be useful, for simple Monte Carlo simulations.

Further information on all of these topics can be found in a standard undergraduate statistics textbook, for example

- J.A. Rice, 1999, *Mathematical Statistics and Data Analysis*, 2nd edn, Duxbury Press (more recent edition available); or
- Morris H, DeGroot, and Mark J Schervish, 2002, *Probability & Statistics*, Addison Wesley, 3rd edn.

Topics:

1. Frequentist and Bayesian approaches to inference.
2. Bayes factors, and their approximation and bounds.
3. P-values, various inferential fallacies.
4. Conditionality and the Likelihood Principle (LP).
5. Implications of the LP, ancillarity, stopping rules.

Assessment: Exam-style questions on the implementation of different approaches in particular types of inference, possibly involving additional reading.

The current syllabus, for reference is:

Statistical Inference

Module leader: D. Firth

Aims: This module will provide students with a solid understanding of the main approaches to statistical inference, their strengths and limitations, their similarities and differences, and their role in underpinning statistical methodology.

Learning outcomes: After taking this module students should have an appreciation of the predominant modes of inference and their inter-relationships, and should be better equipped to read the published literature on both technical and foundational aspects of inference.

Prerequisites: Students should review the following definitions and results: likelihood, sufficiency, Bayes' theorem; simple properties of normal, exponential, binomial and Poisson distributions; linear model and the method of least squares.

Topics:

- Role of formal inference, nature of probability, frequentist and Bayesian approaches.
- Role of sufficiency; role of Neyman-Pearson theory; relation between significance tests and confidence limits.
- Maximum likelihood and associated issues; properties in 'standard' situations, and in some more difficult cases.
- Exponential-family models.
- Other approaches (e.g., estimating equations, pseudo-likelihoods).

Assessment one of:

- An essay on one of a list of topics suggested by the module leader.
- Report of a numerical investigation on one of a list of topics suggested by the module leader, e.g., comparing Bayesian and frequentist approaches to the analysis of a particular model, or assessing the accuracy of inferences based on large-sample approximation.

Written Contributions

David Elston (BioSS)

Dear Wilf & David,
Please accept my apologies for absence from the APTS Advisory Committee meeting (AC6) on 13th September 2012.

I wish to make four observations.

1) The system as a whole seems to be working well, which is good, but I wonder whether the cause for the drop-off in attendance through the weeks has been investigated and responded to (from the questionnaire returns, 84 week 1, 62 week 2, 43 week 3).

2) I think the Asymptotics course is not the best place to deal with some of the issues raised by high-dimensional data: to my mind, the Inference course is the best place for some issues, particularly the shift from thinking about false positive rates (exemplified by p-values) to false discovery rates (having set a p-value threshold to identify 'discoveries', what proportion of the putative discoveries are likely to be genuine). Although these methods are used in a bioinformatics context, they are much more general than that and have a role in data mining approaches to extracting information from large databases.

3) I can understand not having a distinct module on Design, but I would be both surprised and disappointed if design issues were not raised within existing modules. If not, then we are training statisticians to be expert at analysis, but not to be rounded members of collaborative teams, in which the statistical expert is expected to guide data collection as well as analysis. The idea that statisticians should be involved in the planning of designed experiments but not the planning of collection of data in observational studies is a common mis-understanding which we should strive to dispell.

It would seem natural to be to have sections on design in (at least) the modules on:
Statistical Inference (in association with power calculations, using design as a way of reducing variation between comparisons of interest);
Statistical Modelling (principles of D-optimality and A optimality as ways of measuring the information content associated with sets of design points);
Spatial and Longitudinal Data Analysis (eg layout of sampling points to obtain a good spread of information about the variogram); and
Non-parametric Smoothing (how should expectation about the shape of the response guide the collection of apporpriate data).
These sections do not have to be large, but they should surely be there!

4) I have advocated previously but without success some kind of 'overview of the discipline of statistics' lecture. I still think this would be a good way of putting the modules into context, and laying out what's not covered to encourage the cohort of PhD students to see the APTS courses and their own PhD work as part of a (necessarily) much wider discipline.

I hope the meeting goes well, and look forward to seeing a copy of the minues.

David
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James Hutton Institute (JHI), a registered Scottish charity No. SC041796
and a company limited by guarantee No. SC374831

Jonathan Rougier (Bristol)

Also, some brief comments for the Advisory Committee meeting. I would strongly support a module on high-dimensional inference, including high throughput assessment, multiple testing, and BH screening to control the FDR. I would also support more material on classification, which is a bridge into machine learning.

and the later addition

And can I just support David Elston's point 2. If I had had 1.5 more hours I would like to have covered multiple testing and high dimensional screening in the Statistical Inference. Working through the proof of the BH FDR bound would be a good experience for the students. But the underlying theme of my syllabus is "Know what you can and what you cannot infer" and I think the material on ancillarity and stopping rules in the final slot is central to current practice, eg in medical science.

Jonty

Dave Woods (Southampton)

Dear Adam and Robin

As Robin will be attending the meeting tomorrow to represent Southampton, I thought I would comment briefly on the the discussion from both Tim Davis and David Elston on including Design in APTS.

As discussed at the last executive committee, I am planning on including a short session (~1 - 1.5 hours) on Design of Experiments in the Stats Modelling module. This is will include the fundamental principals of design (so at least nodding in the direction of Tim's comments) and the basics of how a good design can allow for more informative modelling (cf David's comments).

[For the latter topic, my main focus was going to be on confounding and bias (both deliberate and accidental), as this seems to fit in well with model choice, a main theme of the Stats Modelling course.]

Thanks and best wishes
Dave

Shuaiwei Zhou (Student Representative; TCD)

As I was given the role as a student representative after the APTS at Cambridge and I did not attend the APTS at Warwick due to the visa issue,
the only feedbacks I collected are about the APTS in Nottingham and Glasgow.

APTS at Nottingham:
1. The students generally believed that the Asymptotics Statistics was kind of challenge to understand. Generally speaking (as different students have varied levels), we would prefer the leader of the module spend more time explaining the basic theories and applications in Asymptotics and it would be preferable if more exercises could be mentioned and instructed in class.
2. The students found that the dinners at Nottingham cost much time, which were 2-hours each day. Actually we have to admit that the dinner at Nottingham were brilliant.

APTS at Glasgow:
1. For the Spatial and Longitudinal Data Analysis, we would like to say if the leader of this module could provide a more detailed lecture notes rather than slides.
2. For the Nonparametric Smoothing, a few students talked to me that they prefer to have the notes available in advance rather than having to take notes in class.

In all, we really appreciate the organisations in every APTS module, which have inspired us very much and gave us the entrance to Statistics and a wonderful chance to meet the fellows in Statistics in UK and beyond. Also Nat and I created a mail list for the students who registered in the list and a Facebook page for the fellows, which we believe would enhance the communication between us.