Swinburne University Boot Camp outline schedule

as at 9 November 2017

Note

This is an outline only. We will not try to "cover all the material", as we believe it is more important for participants to have a good grasp of the basic concepts than to be exposed to a lot of material superficially.

Proposed work flow

Items in **bold** are physical activities.

Time slot	What we do	Comments
Before the workshop begins	Before the Boot Camp participants are asked to: 1. Download and install the necessary software and R packages, and Solver if using Excel. 2. Download and preview the workshop materials. 3. Send in one PPT slide to introduce themselves; these are compiled and used for the "Introductions" session. 4. Complete the pre-course knowledge survey.	
Mon 4 Dec 2017 Day 1 Preliminaries, wildlife data and sampling error, R statistical software	1. Registration, collect name tags, hand in knowledge surveys, etc. 2. Why wildlife data are different (PPT) 3. Introductions (PPT / round-the-room) 4. Housekeeping, times 5. **Cross the line** activity 6. **Frogs in ponds 1** : binary data and binomial distribution 7. **Orangutan 1** : count data and Poisson distribution 8. oRientation : R basics 9. Quiz	
Tues 5 Dec Day 2 Bayesian methods for binary data and for count data	1. Review previous day + quiz, today's quiz sneak peek 2. Rain and clouds (PPT) 3. Rare disease : **Hep S activity** 4. Hep S 2: Comb method **+ Bayes visit** 5. Bayes biopic and Bayes Rule (PPT) 6. Orangutan 2 : Bayesian analysis of count data, comb method in spreadsheet then in R. 7. **Ages** : median, mean, sum-of-squares, MAD, variance, SD 8. **Squirrels 1** : mean, degrees of freedom, variance, SD. 9. Quiz	
Wed 6 Dec Day 3 Bayesian analysis with MCMC	1. Sketch: Bayes balls 2. Review previous day + quiz; today's quiz sneak peek 3. Distributions; **spinner activity** 4. **Dice activity** for "Why is Gaussian normal?" 5. Squirrels 2 : • Bayesian analysis, estimation of population mean	

	and SD, credible intervals with `wiqid`. • Using samples to define a distribution. • Look at MCMC output; Kruschke's politician • Look at strong vs weak priors. 6. Exercise: estimate mean size for two groups of crabs; look at probability that those inside protected area are bigger. 7. Frogs in ponds 2: Bayesian analysis and CrI. 8. Quiz	
Thurs 7 Dec	Rest day	
Fri 8 Dec Day 4 Likelihood and AIC, regression	1. Review previous day + quiz; today's quiz sneak peek 2. Probability meanings: **Fisher vs Bayes**; non-Bayesian methods using only likelihood. 3. Frogs 3 : analysis with likelihood only 4. **Frogs 4** : modelling + **Akaike visit** 5. Akaike biopic 6. **Which bag** : AIC 7. Belugas : Simple regression 8. **Socks in Box** (logistic regression) + spreadsheet + R 9. Quiz	
Sat 9 Dec Day 5 Study Design : the research question, sampling strategies	1. Review previous day + quiz; today's quiz sneak peek 2. Belugas 2: Decision making and loss functions 3. **Marmosets** : 2 questions, 1 design 4. **Participants' research questions (RQs)** : put up on sticky sheet 5. Design Schema 1 : 2 types of study, look at RQs 6. Discuss causation and experiments 7. Quasi-experiments and BACI (PPT), any RQs suitable for this? 8. **Pseudo-replication** 9. Design Schema 2 : observational studies 10. Sampling (PPT) 11. Design Schema 3 : choice of sampling strategy 12. Quiz	
Sun 10 Dec Day 6 Study Design : simulations, data recording and management	1. Review previous day + quiz; today's quiz sneak peek **2. Sampling shells** 3. Design Schema 4 : Measurement, Putting it together 4. Simulations in R: squirrel sample size, *Rafflesia* and stratified sampling. 5. Data management (PPT) 6. **Dates in spreadsheets** 7. **Road kills exercise** 8. Quiz	
Mon 11 Dec	Rest day	

Tues 12 Dec Day 7 Occupancy	1. Review previous day + quiz; today's quiz sneak peek 2. **Ants** or **Where's Waldo?** : Analysis in R, then back to spreadsheet to explain need for >1 survey. 3. American toads in R, with covariates and time trend: Bayesian and MLE versions 4. Meaning of occupancy: **frogs-in-ponds, herons-at-ponds, porcupine activity**. 5. (if time) Multi-season design or Royle-Nichols or two-species in R, depending on participants' interests/needs. 6. Design of occupancy studies (PPT) 7. Overview of extensions of occupancy (the multis) (PPT) 8. Quiz	
Wed 13 Dec Day 8 Density from mark-recapture data	1. Review previous day + quiz; today's quiz sneak peek 2. Intro to SECR (PPT) 3. **Geckos board game,** analysis with 'secr' package in R; MCMC version in `wiqid` 4. Stoats as main example (`secr` in R). 5. (if time) SECR with individual or site covariates 6. Study design for SECR: detector types, scattered clusters of traps (PPT) 7. Quiz	
Thurs 14 Dec Day 9 Survival : Cormack-Jolly-Seber (CJS) model, robust design	1. Review previous day + quiz; today's quiz sneak peek 2. **Rats experiment** for CJS survival, analysis in R (MLE & Bayes) 3. Dipper CJS survival (ML & Bayes) in R 4. Closed captures as stepping-stone to robust design. 5. Robust design in R 6. Design issues for survival estimation 7. Plans for next day 8. Quiz	
Fri 15 Dec Day 10 à la carte	1. Review previous day + quiz 2. Whatever folks requested… (options are: review and further examples of topics covered already; relevant topics not covered already; presentation and discussion of participants' research questions). 3. Post-course knowledge survey and participants' feedback 4. Importance of follow up for short courses. 5. Presentation of certificates 6. Wrap-up	