

# Boot Camp at SUT, August 2018, outline schedule

as at 24 July 2018

## 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	<p>Before the Boot Camp participants are asked to:</p> <ol style="list-style-type: none"> <li>Download and install the necessary software and R packages, and Solver if using Excel.</li> <li>Download and preview the workshop materials.</li> <li>Send in one PPT slide to introduce themselves; these are compiled and used for the “Introductions” session.</li> <li>Complete the pre-course Knowledge Survey.</li> </ol>	
Mon 13 Aug 2018 Day 1 Preliminaries, wildlife data and sampling error, R statistical software	<ol style="list-style-type: none"> <li>Registration, collect name tags, hand in knowledge surveys, etc.</li> <li>Why wildlife data are different (PPT)</li> <li>Introductions (PPT / round-the-room / throw socks)</li> <li>Housekeeping, times, code of conduct</li> <li><b>Cross the line</b> activity</li> <li><b>Frogs in ponds 1</b> : binary data and binomial distribution</li> <li><b>Orangutan 1</b> : count data and Poisson distribution</li> <li>Orientation : R basics</li> <li>Quiz</li> </ol>	
Tues 14 Aug Day 2 Bayesian methods for binary data and for count data	<ol style="list-style-type: none"> <li>Review previous day + quiz, today's quiz sneak peek</li> <li>Rain and clouds (PPT)</li> <li>Rare disease : <b>Hep S activity</b></li> <li>Hep S 2: Comb method + <b>Bayes visit</b></li> <li>Bayes biopic and Bayes Rule (PPT)</li> <li>Orangutan 2 : Bayesian analysis of count data, comb method in spreadsheet then in R.</li> <li><b>Ages</b> : median, mean, sum-of-squares, MAD, variance, SD</li> <li><b>Squirrels 1</b> : mean, degrees of freedom, variance, SD.</li> <li>Quiz</li> </ol>	
Wed 15 Aug Day 3 Bayesian analysis with MCMC	<ol style="list-style-type: none"> <li>Sketch: <b>Bayes balls</b></li> <li>Review previous day + quiz; today's quiz sneak peek</li> <li>Distributions; <b>spinner activity</b></li> <li>(if time: <b>Dice activity</b> for “Why is Gaussian normal?”)</li> <li><b>Squirrels 2</b> : <ul style="list-style-type: none"> <li>Bayesian analysis, estimation of population mean</li> </ul> </li> </ol>	

	<p>and SD, credible intervals with <math>w_{iqid}</math>.</p> <ul style="list-style-type: none"> <li>• Using samples to define a distribution.</li> <li>• (if time: look at MCMC process; Kruschke's politician.)</li> <li>• Compare strong vs weak priors.</li> </ul> <p>6. Exercise: estimate mean size for two groups of crabs; look at probability that those inside no-fishing zone are bigger.</p> <p>7. Frogs in ponds 2: Bayesian analysis and CrI.</p> <p>8. Quiz</p>	
Thurs 16 Aug	Rest day	
Fri 17 Aug Day 4 Likelihood and AIC, regression	<ol style="list-style-type: none"> <li>1. Review previous day + quiz; today's quiz sneak peek</li> <li>2. Probability meanings: <b>Fisher vs Bayes</b>; non-Bayesian methods using only likelihood.</li> <li>3. Frogs 3 : analysis with likelihood only</li> <li>4. <b>Frogs 4</b> : modelling + <b>Akaike visit</b></li> <li>5. Akaike biopic</li> <li>6. <b>Which bag</b> : AIC</li> <li>7. Belugas : Simple regression</li> <li>8. <b>Socks in Box</b> (logistic regression) + spreadsheet + R</li> <li>9. Quiz</li> </ol>	
Sat 18 Aug Day 5 Likelihood cont. Study Design : the research question, design schema	<ol style="list-style-type: none"> <li>1. Review previous day + quiz; today's quiz sneak peek</li> <li>2. More on AIC</li> <li>3. Belugas 2: Decision making and loss functions</li> <li>4. <b>Marmosets</b> : 2 questions, 1 design</li> <li>5. <b>Participants' research questions (RQs)</b> : put up on sticky sheet</li> <li>6. Design Schema 1 : 2 types of study, look at RQs</li> <li>7. Discuss causation and experiments</li> <li>8. Quasi-experiments and BACI (PPT), any RQs suitable for this?</li> <li>9. <b>Pseudo-replication</b></li> <li>10. Design Schema 2 : observational studies</li> <li>11. Quiz</li> </ol>	
Sun 19 Aug Day 6 Study Design : sampling strategies, simulations	<ol style="list-style-type: none"> <li>1. Review previous day + quiz; today's quiz sneak peek</li> <li>2. Sampling (PPT)</li> <li>2. Design Schema 3 : choice of sampling strategy</li> <li>3. <b>Sampling shells</b></li> <li>4. Design Schema 4 : Measurement, Putting it together</li> <li>5. Simulations in R: squirrel sample size, <i>Rafflesia</i> and stratified sampling.</li> <li>6. Quiz</li> </ol>	
Mon 20 Aug	Rest day	

<p>Tues 21 Aug Day 7 Occupancy</p>	<ol style="list-style-type: none"> <li>1. Review previous day + quiz; today's quiz sneak peek</li> <li>2. <b>Ants</b> or <b>Where's Waldo?</b> : Analysis in R, then back to spreadsheet to explain need for &gt;1 survey.</li> <li>3. American toads in R, with covariates and time trend: Bayesian and MLE versions</li> <li>4. Meaning of occupancy: <b>frogs-in-ponds, herons-at-ponds, porcupine activity.</b></li> <li>5. (if time) Multi-season design or Royle-Nichols or two-species in R, depending on participants' interests/needs.</li> <li>6. Design of occupancy studies (PPT)</li> <li>7. Overview of extensions of occupancy (the multis) (PPT)</li> <li>8. Quiz</li> </ol>	
<p>Wed 22 Aug Day 8 Density from mark-recapture data</p>	<ol style="list-style-type: none"> <li>1. Review previous day + quiz; today's quiz sneak peek</li> <li>2. Intro to SECR (PPT)</li> <li>3. <b>Geckos activity</b>, analysis with 'secr' package in R; MCMC version in <code>wiqid</code></li> <li>4. Stoats as main example (<code>secr</code> in R).</li> <li>5. (if time) SECR with individual or site covariates</li> <li>6. Study design for SECR: detector types, scattered clusters of traps (PPT)</li> <li>7. Quiz</li> </ol>	
<p>Thurs 23 Aug Day 9 Data management. Survival : Cormack-Jolly-Seber (CJS) model</p>	<ol style="list-style-type: none"> <li>1. Review previous day + quiz; today's quiz sneak peek</li> <li>2. Data management (PPT)</li> <li>3. <b>Dates in spreadsheets</b></li> <li>4. <b>Road kills exercise</b></li> <li>5. <b>Rats experiment</b> for CJS survival, analysis in R (ML &amp; Bayes)</li> <li>6. Dipper CJS survival (ML &amp; Bayes) in R</li> <li>7. Design issues for survival estimation</li> <li>8. Plans for next day</li> <li>9. Quiz</li> </ol>	
<p>Fri 24 Aug Day 10 à la carte</p>	<ol style="list-style-type: none"> <li>1. Review previous day + quiz</li> <li>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).</li> <li>3. Post-course knowledge survey and participants' feedback</li> <li>4. Importance of follow up for short courses; postcards.</li> <li>5. Presentation of certificates</li> <li>6. Wrap-up</li> </ol>	