Schedule

NRES 746

Fall 2021

## Schedule

Note: this schedule is subject to change. Please check for updates frequently!

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| --- | --- | --- | --- | --- | --- | --- |
| Week | Lecture.1 | Lecture.2 | Lab | Final.project.timeline | Material.Covered | Readings |
| Aug. 23 | Course Introduction | Algorithms | Lab #1: Programming algorithms in R | Start organizing into groups and gathering dataset(s) | Review syllabus, algorithmic approach to data analysis, basic programming in R | Clark Ch. 1; Touchon and McCoy 2016 |
| Aug. 30 | Algorithms | Probability | Lab #1: Programming algorithms in R (continued) |  | Basic probability calculus, working with probability distributions | Bolker ch. 4; Zurell et al. 2010; |
| Sept. 6 | No class (labor day) | Probability | Final project #1 | Organize in groups around project themes and locate suitable data sets for analysis | Generating data algorithmically, mechanistic models, power analysis, goodness-of-fit testing | Bolker Ch. 1, Ch 5.; Zuur et al. 2010 (optional) |
| Sept. 13 | The Virtual Ecologist | Likelihood | Lab #2: “Virtual Ecologist” | Work on one-page project description (“proposals”) | Maximum likelihood estimation | Bolker Ch. 6; Hobbs and Hilborn 2006 (optional) |
| Sept. 20 | Likelihood | Likelihood | Lab #2: “Virtual Ecologist” (continued) | DUE: one-page descriptions of project ideas (“proposals”) | Optimization algorithms for maximum likelihood inference | Bolker Ch. 7 |
| Sept. 27 | Optimization | Optimization | Final project #2 | Review proposals with instructor | General introduction to Bayesian theory and application | Bolker Ch. 6 and 7 (Bayesian section); Ellison 2004 |
| Oct. 4 | Bayesian inference | Markov Chain Monte Carlo (MCMC) | Lab #3: Maximum likelihood | Start running analyses and generating figures | Markov-Chain Monte Carlo | Bolker Ch. 7 and 8 |
| Oct. 11 | Markov Chain Monte Carlo (MCMC) | No class (instructor is away) | Lab #3: Maximum likelihood (and digression: graphics in R, generating publication-quality figures) |  | Model selection | Bolker Ch. 7 and 8 |
| Oct. 18 | Model selection and multi-model inference | Model validation and performance evaluation | Final project #3 |  | Bias-variance tradeoff, cross-validation, assessing predictive accuracy | Anderson et al. 2000; Anderson et al. 2001; Wintle et al. 2003 |
| Oct. 25 | Model validation and performance evaluation | Machine learning with random forest | Lab #4: Bayesian model fitting in JAGS |  | Bias-variance tradeoff, cross-validation, assessing predictive accuracy | TBD |
| Nov. 1 | student-led lecture/demo | student-led lecture/demo | Lab #4: Bayesian model fitting in JAGS (continued) |  | Student-led topics | TBD |
| Nov. 8 | student-led lecture/demo | student-led lecture/demo | Final project #4 |  | Student-led topics | TBD |
| Nov. 15 | student-led lecture/demo | student-led lecture/demo | Optional: Model selection and performance evaluation (including cross-validation) |  | Student-led topics | TBD |
| Nov. 22 | student-led lecture/demo | No class (thanksgiving holiday) | Final project #5 |  | Student-led topics | TBD |
| Nov. 29 | student-led lecture/demo | student-led lecture/demo | Complete “mini-lab” assignments provided by peers | Final project complete drafts due this week | Student-led topics | TBD |
| Dec. 6 | Class wrap-up | No class (prep day) | Final project presentations | Final presentations! | Student-led topics |  |
| Dec. 13 | NA (classes over) | NA | NA | Final projects due Dec. 15 |  |  |