Schedule

NRES 746

Fall 2021

Schedule

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

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

Final project #6

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