

Reminder

- ▶ **Final Exam: April 11 2:00 – 5:00 pm SS 1085**
 - ▶ 4 questions
 - ▶ one theory question
 - ▶ one applied question
 - ▶ one question from HW
 - ▶ one question about a study
 - ▶ one question with computer output
- ▶ SM: 9.1, 9.2.1, 9.2.2 (to end p.431), 9.3.1, 9.4.2; 10.1, 10.2, 10.3, 10.4, 10.6, 10.7.1 (skip p.529-530), 10.7.2, 10.7.3, 10.8.1, 10.8.2 (skip log rank test, time-dependent covariates)
- ▶ C& D: from slides only – Ch 1, 2, 7.2, 7.3, 6.5

- ▶ Office Hours: April 8, 9, 10; 3 – 5

- ▶ **HW 4: due April 11**

Material covered

Cox & Donnelly

- ▶ Chapter 1: Components of investigations; experimental and observational studies; overview of principles
- ▶ Chapter 2: Design of studies; unit of study and analysis; observational studies; systematic error; random error; sample size
- ▶ Chapter 7: Model choice; non-specific effects
- ▶ Chapter 6.5: Empirical models

... material covered

Statistical Models Chapters 9 and 10

- ▶ randomization and causality; randomization inference (two-sample only); factorial treatment structure; Latin squares, Graeco-Latin squares; incomplete block designs
- ▶ generalized linear models – general form, linear predictor, link function, scale parameter, variance function, likelihood-based inference, iteratively re-weighted LS fitting, deviance, AIC for model selection
- ▶ binary and binomial regression; over dispersion; saturated model; Bayesian logistic regression
- ▶ nonlinear least squares
- ▶ random effects models: linear with normal errors; generalized linear mixed models; estimation of random effects; REML estimation of variance components
- ▶ semi-parametric regression: kernel smoothing; local averaging; local polynomial regression; inference for smooth functions; bandwidth selection and cross-validation; generalized linear models
- ▶ smoothing splines; regression splines; shrinkage – ridge and Lasso; generalized additive models
- ▶ survival data: hazard function; survivor function; censoring; proportional hazards model; partial likelihood;

... material covered

Studies

- ▶ reading and fMRI
- ▶ placebo effect study
- ▶ medicaid natural experiment
- ▶ cheating survey
- ▶ biomarkers to predict Alzheimer's
- ▶ biomarkers and survival; ROC curve; area under the curve; specificity and sensitivity
- ▶ health effects of air pollution (NMMAPS)