


# Schedule and Syllabus

| Week | Date (Mon) | Monday Lecture | Wednesday Lecture | Lab on Friday | HW |
|---|---|---|---|---|---|
| W1 | Sep 3 | HOLIDAY | Probability, Conditionals, distributions, and Entropy, KL? | Math, Stats Refresher, Gaussian distrib, algebra and matrix calculus | HW1 |
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| W2 | Sep 10 | Sampling, Expectations, LLN, CLT, LOTUS, and Monte Carlo, inverse transform | Frequentist MLE and sampling, Bootstrap, Binomial distribution, MLE for regression, regression eg | poisson-gamma MLE, freq stats. | HW2 |
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| W3 | Sep 17 | Bayesian Stats with conjugate priors, normal regularization, beta-binomial | Rejection Sampling, Box Mueller, Importance Sampling | Conjugate examples: poisson, binomial | HW3 |
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| W4 | Sep 24 | Regression, predictive distribution, bias-variance tradeoff, regularization. Bayesian regression? | Loss functions, Information theory, KL-Divergence and Deviance, Bayes risk, AIC | Sine curve regression, confidence intervals, credible intervals? | HW4 |
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| W5 | Oct 1 | Logistic MLE, Generative counterpart, Classification, Bayes risk, GD, SGD, supervised->unsupervized | More SGD, MLP regression and classification | PyTorch and ANN | HW5 |
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| W6 | Oct 8 | HOLIDAY | Mixtures, EM, Gaussian Mixture models | EM | HW6 |
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| W7 | Oct 15 | Hierarchical Models, intractable posteriors, empirical bayes, grid, laplace, need for MCMC | Markov chains, metropolis, theory | discrete sampling, markov chains | HW7 |
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| W8 | Oct 22 | Metropolis hastings, gibbs, sample checks | Data Augmentation, HMC | By Hand Gibbs for tumors, sample checks | HW8: |
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| W9 | Oct 29 | Exploring HMC, HMC tuning, NUTS. | Sample checks, Energy, Divergence, model problems, ppc, credible intervals | pymc3, coal disasters, bioassay | HW9: |
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| W10 | Nov 5 | ppc, wrapping into bayesian workflow, viz, SBC | Bayesian regression, regression priors and issues, poisson glm | Gelman Schools | HW10: |
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| W11 | Nov 12 | Overdispersion, Correlations, model comparison | Model Comparison oceanic contd. Model selection, averaging | prosocial chimps | HW11: |
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| W12 | Nov 19 | Variational, ADVI | HOLIDAY | HOLIDAY | |
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| W13 | Nov 26 | Variational Inference, how good, VSBC? | Gaussian Processes | Mixture MCMC, variational | Paper Due Friday |

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| W14 | Dec 3 | Simulated Annealing and temperature as a tool | Generative Modeling, Advanced Topics | Lab, Odds and ends, and conclusion | None |
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| W15 | Dec 10 | Conclusion Lecture, READING PERIOD | EXAM PERIOD | EXAM PERIOD | |
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| W16 | Dec 17 | EXAM PERIOD | EXAM PERIOD (Exam Due) | | |
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| W17 | | | | | |

Notes:

- feel like a lecture is missing earlier at ppc/credible and all problems in one go. but think i can make it work by getting analytic bayesian regression earlier