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|  | **Topic** | **Morning Topic (Theory and Mechanisms)**  **1.5 hour**  **10am-11:30 CST**  **5am-6:30am PST**  **Pre-recorded** | **Late Morning - Case-Studies**  **1 hour [C&N]**  **12-1pm CST**  **7-8am PST**  **Live - virtual** | **Afternoon Lab**  **3 hours [C&N]**  **2-5pm CST**  **9-12pm PST**  **Live –virtual** |
| **Mon** | Course introduction; Review model fitting | Intro  Numerical optimization Refresher on Rstudio & R. [Cole] | Course intro, student intros, questions, installation issues,  MS Teams demo  [Cole] | Poisson minimization  Project time: proposals and scope |
| **Tues** | Building linear models in TMB | TMB/C++ syntax, workflow, factors, debugging [Cole] | Questions  Maximum likelihood; Fit LM in R by hand, using lm() and in TMB [Cole] | LM in TMB: add covariates and simulation testing |
| **Wed** | GLMs | Generalized linear models [Noble] | Questions, Estimating uncertainty: standard errors, Delta method [Noble] | Poisson GLM [Noble]  Project time |
| **Thu** | Random effects in TMB | Mixed effects models; Marginal maximum likelihood [Noble] | Questions  Project time | Poisson GLMM [Noble] |
| **Fri** | Beyond GLMMs | Advanced TMB options: mapping, simulation, functions, MCMC [Cole] | Questions  Course conclusion  Project time | Project presentations |