Tentative Outline:

Days 1 & 2 : Powerpoint presentation

1. Introduction to the Bayesian paradigm:
   o Philosophical arguments for the Bayesian approach, exemplified using statistical brain-teasers.
   o Practical arguments for the Bayesian approach.
   o Comparison with frequentist paradigm.

2. Obtaining the posterior distribution using Bayes theorem.
   o Simple example and quick demonstration in WinBUGS.
   o Bayesian inference including point and interval estimation, hypothesis “testing”.
   o Prediction.
   o An examination of examples from the fisheries literature, especially hierarchical models.

3. Prior distributions.
   o Reference/non-informative priors, vague priors.
   o Informative priors.
   o Sensitivity to the prior.

4. Implementation.
   o Markov chain Monte Carlo for sampling from the posterior. Metropolis-Hastings algorithm, Gibbs sampler.
   o The dangers of MCMC, and checking MCMC convergence.

5. Model diagnostics.
   o Model complexity ($p_D$), and model selection using DIC.
   o Model checking using posterior-predictive checks.
Day 3: Introduction to WinBUGS/OpenBUGs

Morning: Introduction to WinBUGS: Model syntax, compiling the model, initial values, updating, thinning, burn-in, monitoring. Evaluating model complexity and fit.
Afternoon: Practice with real data.

Day 4: Running WinBUGS from R

Morning: Using the BRugs package to run WinBUGS from R. Checking MCMC convergence and implementing posterior-predictive checks.
Afternoon: Practice with real data.

Day 5: Advanced topics and tricks

Morning: Truncated densities. The “ones trick” for implementation of non-standard priors or likelihoods. Time permitting, a brief introduction to Automatic Differentiation Model Builder (ADMB) for those models where WinBUGS won’t work.
Afternoon: Practice/demonstrations with real data.