Index

approximate Bayesian computation (ABC), 10, 35, 54, 77–79 auxiliary variable, 55, 75, 76, 78 Bayes' Theorem, 4, 34, 61, 94 Bayesian inference, 2, 4, 23, 35, 60 hypothesis testing, 7 interval estimation, 6, 37, 69, 71, 108 point estimation, 6, 37, 39, 71, 108 Berman-Turner device, 61, 64 binary map, 98 birth-death process, 53, 54 Bochner's Theorem, 18 Campbell's Theorem, 38, 39 censoring, 59 cluster process, 40, 43, 51, 52, 58, 62 composition sampling, 35, 78, 105 conditional intensity (Papangelou), 26, 32, 33, 36, 39, 61, 75, 78 continuous ranked probability score, 9 coregionalization, 97, 103, 107 counting measure, 24, 33, 34 coupling from the past, 54, 78 covariance function, 6, 16, 17, 29, 32, 50, 64, 92, 103 exponential, 17, 70, 87, 107 Matérn, 17, 64, 68, 87 Cox process, 23, 30, 61, 76 credible interval, set, 6, 37, 69, 71 cross-validation, 8, 41, 43, 57, 72, 80 data assimilation, data fusion, 94, 97 displacement, 58edge correction, 27, 37, 44, 73 elliptical slice sampling, 64, 71, 104 empirical Bayes, 6 empirical coverage, 8, 35, 41, 42, 73 errors in variable models, 13 G function, 26, 39, 44, 73, 100 Gaussian process, 16, 29, 50, 61, 64, 66, 68, 70, 84, 89, 91, 96, 103 bivariate, 76, 103 multivariate, 103, 107 space-time, spatio-temporal, 16, 103, 104 Georgii-Nguyen-Zessin result, 38–40 geostatistics, 2, 16, 33, 64, 91, 95, 96, 103 123

Gibbs distribution, 77 Gibbs process, inhibition, repulsive, 25, 31, 41, 46, 52, 57, 58, 61, 74, 75, 77, 99, 100determinantal process, 32, 54, 77 Strauss process, 20, 32, 39, 43, 53, 77, 79, 80, 101 Gibbs sampling, 9–15, 65 Hamiltonian Monte Carlo (HMC), 67 hierarchical model, 1, 7, 10, 11, 13-16, 86, 101 Integrated Nested Laplace Approximation (INLA), 10, 12, 35, 68 isotropy, 17, 26, 87 K function, 28, 36, 38, 39, 44, 45, 59, 61, 79, 81, 99 inhomogeneous function, 38, 40, 46 kernel convolution, 89 kernel density estimator, 28 kernel intensity estimator, 22, 23, 29, 36, 38, 47 latent variables, 10, 11, 13, 15, 69 linear model of coregionalization, 107 location distribution, 25, 26, 41 log Gaussian Cox process (LGCP), 12, 29, 30, 40, 41, 43, 50, 61, 64, 65, 67–69, 86, 87, 93, 96, 103, 106 logistic regression, logit model, 13, 85, 90, 93 marked point process, 4, 31–33, 55, 83, 85, 89, 99 Markov chain Monte Carlo (MCMC), 9, 10, 15, 35, 53, 62, 64, 65, 71, 75–77, 89, 104.107 Markov random field, 31, 68, 85 mean square continuity, differentiability, 17 Metropolis-Adjusted Langevin algorithm (MALA), 65 Metropolis-Hastings algorithm, 11, 54, 63, 65, 66, 71, 75, 76, 107 mixture model, 14, 29, 52 model selection, 7, 35, 41, 43 AIC, BIC, DIC, 9 Bayes factors, 7 posterior predictive, 5, 8, 9, 41, 43, 73 prior predictive, 8, 35, 42moment measures, 25, 28 Neyman Scott process, 21, 30, 36, 51, 76, 81 Matérn process, 31, 51 Thomas process, 31, 51, 76, 81 pair correlation function, 26, 28, 32, 38, 81 Poisson process, 25, 35, 58, 62 homogeneous Poisson process (HPP), 19, 25, 31, 36, 43, 49, 53, 58, 61, 62, 73, 76, 79, 81 nonhomogeneous Poisson process (NHPP), 19, 25, 29, 30, 32, 36, 38, 40, 41, 43, 49–51, 56, 61, 62, 77, 81, 93, 96, 104 predictive mean square error, 9, 35, 43

preferential sampling, 83, 87, 90, 95, 98presence/absence, presence-only, 59, 83-85, 87, 90, 93, 95, 97probit model, 15, 90, 92, 93

random effects, 10, 12, 15, 16, 64, 69, 84, 91 ranked probability score, 9, 35, 43 representative points, 50, 52, 58, 61, 64, 65, 70, 75, 104, 107 residual, 36-38, 40, 41, 73 Bayesian residual, 35 realized residual, 38, 42

shot noise process, 31, 52, 58, 81
simulation, 9, 11, 23, 54, 66, 76, 78
point patterns, 19, 35, 44, 49, 55, 56, 60, 71, 77, 78, 80, 81, 104, 105
stationarity, 12, 16, 17, 24, 26, 27, 44, 46, 49, 73, 79
stochastic integral, 30, 61, 63, 88
superposition, 43, 58, 59, 81, 87, 100, 104

thinning, 41, 43, 49, 50, 57, 60, 72