Short Summary of ST222

Part I: Normative decision theory
Concepts of probability: axiomatic probability, frequentist probability, subjective probability
Elicitation of probabilities
Connection between rationality, coherence and axioms of probability, Dutch books
Conditional probability and applications (e.g. error rates in screening tests)
Random variables, expectation
Loss functions, predictions and optimal decisions (EMV strategy)
Decision models, decision trees
Alternatives to EMV (maximin, maximax)
Utility, CME, risk attitudes
EUV strategy
Preference relation and properties (e.g. symmetry, reflexivity, transitivity, negative transitivity, Archimedean, independence), representation theorems, examples (e.g. lexicographical order)

Part II: Basic game theory
Mathematical model for games (moves, payoff matrix etc)
Separability
Dominance
Competitive games, zero-sum games
Mixed strategies, fundamental theorem for zero-sum games

Part III: Descriptive decision theory
Axiomatic versus descriptive models of humans
Perceived, measured and expected patterns in random sequences (e.g. runs)
Heuristics and biases in human (quantitative) judgement including: gambler's fallacy, hot hand, clustering illusion, anchoring bias, framing effect, base rated neglect, incoherent choice behaviour, conjunction fallacy, misconceptions of representativeness, confirmation bias.
Prospect theory (probability weighting functions, value function, modified EUT)
Allais paradox (common ratio and common condequence setting)
Mathematical modelling