ILOs:

- calculate various probabilities on a discrete probability space through counting arguments using combinations, permutations, factorials and multinomials;
- state, prove, apply, and extend various identities for the set operations in probability;
- calculate probabilities through appropriate application of conditional probabilities and independence;
- evaluate and prove properties of the expectation and variance of random variables in both the discrete and continuous setting including Bernoulli, Binomial, Geometric, Poisson, and Normal distributions;
- convert distributions between normal distributions and the standard normal distribution and state their application in results such as the the weak law of large numbers and central limit theorem;
- state, prove, apply and extend probabilistic inequalities such as Markov's inequality and Chebychev's inequality.

Exam:

Q1. This question was generally well done completing the state and apply part of ILO2. May students were able to complete the proof at the last part of the question thus completing the ILO2.

Q2. ILO3 and ILO4 were tested. Many could recall the geometric distribution and could calculate its mean. The last part which tested a conceptual understanding of independence.

Q3. ILO1 and ILO4 were tested. The hint to change the sum and expectation in a) ii) needed to be more explicit. Many could do part b)i) thus demonstrating ILO1.

Q4. Tested ILO4 for continuous distributions. Was well done but continuous distributions need to be reinforced in future courses.

Q5. ILO5 tested conceptual understanding of the central limit theorem. Tested mathematical understanding rather than calculation.

Q6. ILO5 was tested. There was a typo in the last part. The mark scheme was modified to account for this. The question was well done. Calculations with normal and Poisson distributions are well understood by students.