| Module code | SM-2205 | | | |
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| **Module Title** | Intermediate Statistics | | | |
| **Degree/Diploma** | Bachelor of Science (Mathematics) | | | |
| **Type of Module** | Major Core | | | |
| **Modular Credits** | 4 | **Total student Workload** | 10 | hours/week |
| | | **Contact hours** | 4 | hours/week |
| **Prerequisite** | SM-1201 Mathematical Methods for the Sciences | | | |
| **Anti-requisite** | BB-1102 Business Statistics | | | |
| | SM-2403 Introductory Statistic | | | |

**Aims**

The module is designed for students to understand the fundamental principles of probability and statistics and to apply these techniques in real world problems.

**Learning Outcomes**

*On successful completion of this module, a student will be expected to be able to*:

| Lower order : | 30% | - understand the basic principles of descriptive and inferential statistics and various distributions |
|---|---|---|
| Middle order : | 60% | - analyse various categorical and numerical data |
| Higher order: | 10% | - interpret the results of analyses |
| | | - work independently and in a team |

**Module Contents**

- Descriptive statistics, tables and graphs.
- Probability, discrete probability distributions such as Bernoulli, discrete uniform, binomial, hypergeometric, Poisson, geometric and negative binomial. Expected values and standard deviation of discrete random variables.
- Continuous probability distributions such as uniform, exponential, gamma, beta and normal. Expected values and standard deviation of continuous random variables.
- Approximation results including Chebyshev's inequality, Normal and Poisson approximations to the binomial distribution.
- Statistical inference: sampling distributions, central limit theorem, estimation and confidence intervals of means, proportions and variances, hypothesis tests for means, proportions and variances.
- Joint, marginal and conditional distributions for discrete and continuous random variables; conditional expectation, covariance and correlation for jointly distributed random variables; bivariate normal distribution and related concepts.
- Linear regression, confidence intervals and tests of hypothesis for the slope and intercept parameters, prediction and confidence intervals for the predicted value of the dependent variable for a given value of the independent variable.

| **Assessment** | Formative assessment | Tutorial and feedback. |
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| | Summative assessment | Examination: 60% |
| | | Coursework: 40% |
| | | - 2 tests (40%) |