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# Module Descriptor

# Introduction to Applied Statistics (Computing and Mathematics)

# Introduction to Applied Statistics (A33601)

**Short Title:** Intro. to Applied Statistics
**Department:** Science
**Credits:** 5 **Level:** Advanced

## Description of Module / Aims

This module introduces the student to some fundamental statistical concepts, to probability and sampling mechanisms as well as basic methods in descriptive and inferential statistics and regression.

## Programmes

| | stage/semester/status |
|---|---|
| HDip in Science in Data Analytics (WD_KDAAN_G) | 1 / 1 / M |

## Indicative Content

- Introduction to statistics: types of variables (scale, nominal, ordinal); predictor versus response and observational versus experimental variables; descriptive and inferential statistics; population and sample; introduction to probability
- Sampling: probability versus non-probability; simple random; stratified; cluster; systematic; convenience etc., randomising the run order of experiments.
- Descriptive statistics: statistics measuring centre (mean, median, mode) and spread (standard deviation, quartiles); charts for categorical data (bar charts, pie charts) and scale data (histogram, stem and leaf plot, boxplot); analysis of outliers
- Normal distribution: calculating probabilities and quartiles; verifying normality-probability plots; other distributions
- Statistical Inference: null and alternative hypothesis; p-values; confidence intervals for means; t-tests; two sample paired and independent and ratio of variances; interpreting ANOVA table
- Linear regression: parameter estimation using graphical and analytical methods; correlation coefficient; prediction; interpolation and extrapolation
- Using a suitable software application such as Minitab or MS Excel: selecting appropriate methods correctly; interpreting output meaningfully

## Learning Outcomes

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

1. Describe and summarize the nomenclature and classifications of introductory statistics.
2. Interpret appropriate descriptive statistics constructs and graphs to summarize variables of different types.
3. Discuss methods of sampling.
4. Compute using a calculator and tables, tests of statistical significance and interpret the analysis.
5. Apply and appraise regression models.
6. Determine the goodness of fit of the normal distribution model to sample data.
7. Calculate elementary statistical analysis and interpret the output using industrial standard statistical software (e.g. Minitab).

## Learning and Teaching Methods

- Lectures.
- In class exercises.
- Discussion.
- Self-directed learning is emphasized. Students are supported with notes, online material and feedback.
- Practicals using statistical software supports the learning experience.

## Learning Modes

| Learning Type | F/T Hours | P/T Hours |
|---|---|---|
| Lecture | 24 | 24 |
| Practical | 24 | 24 |
| Independent Learning | 87 | 87 |

## Assessment Methods

| | Weighting | Outcomes Assessed |
|---|---|---|
| Continuous Assessment | 100% | |
| Practical | 30% | 2,3,7 |
| Practical | 30% | 4,6,7 |
| Practical | 30% | 4,5,7 |
| Presentation | 10% | 1,7 |

## Assessment Criteria

*<40%:* Very limited knowledge and understanding of descriptive and inferential statistics and regression.

*40%–49%:* Demonstrate a limited knowledge of descriptive and inferential statistics and regression..

*50%–59%:* Demonstrate satisfactory general knowledge of the main issues within descriptive and inferential statistics and regression.

*60%–69%:* Demonstrate sound knowledge of descriptive and inferential statistics and regression. Show ability to analyse and logically argue in an effective and mature style.

*70%–100%:* Demonstrate authoritative handling of complex material and provide well focused analysis and convincing arguments on statistics and regression.

## Supplementary Material(s)


- Berenson, M.L., D.M. Levine, K.A. Szabat and D.F. Stephan. *Basic Business*. 14th ed.. New York: Pearson, 2020.
- Gupta, B.C., I. Guttman and K.P. Jayalath. *Statistics and Probability with Applications for Engineers and Scientists Using MINITAB, R and JMP*. 2nd ed.. New York: Wiley, 2020.
- Walpole, R.E., R.H. Myers, S.L. Myers and K. Ye. *Probability and Statistics for Engineers and Scientists*. 9th ed.. US: Pearson, 2016.


## Requested Resources

- Room Type: Computer Lab