APPLY STATISTICAL TECHNIQUES

UNIT CODE: MATH/OS/AS/CC/02/6/A

UNIT DESCRIPTION:

This unit describes the competencies required by a statistician in order to apply statistical concepts, apply statistical methods, apply statistical methods 2 and apply statistics for business in a work place environment.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT These describe the key outcomes which make up workplace function.	**PERFORMANCE CRITERIA** These are assessable statements which specify the required level of performance for each of the elements. ***Bold and italicized terms are elaborated in the Range.***
1. Apply statistical concepts	1.1 Definitions of key terms are done as per the statistical concepts 1.2 Demonstrate knowledge of types, importance and limitations of statistics as per the required standard 1.3 Demonstrate knowledge of symbols used as per the concepts 1.4 Demonstrate knowledge of levels of measurements as per the data type 1.5 Data is classified and tabulated as per the class and intervals 1.6 Demonstrate knowledge of sources and methods of data collection 1.7 Graphical data presentation is performed as per the procedures 1.8 Data compilation is performed as per the requirement 1.9 Calculations involving means, mode and median are performed as per the procedures 1.10 Calculations involving measures of dispersion is performed as per the procedures

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2. Apply statistical methods 1	5.1 Demonstrate knowledge of techniques and types of sampling procedures as per the requirements 5.2 Demonstrate knowledge and calculations involving population and samples. I.e. Statistic and ***parameter*** as per the procedures 5.3 Knowledge about sampling distributions is demonstrate as per the procedures 5.4 Knowledge and calculation involving probability theory is demonstrated as per the procedures 5.5 Calculation involving ***probability distributions***, expected values etc. are performed as per the procedures 5.6 Calculation involving moments and moments generating functions is done as per the procedures 5.7 Knowledge and calculations involving central limit theorem is performed as per the procedures

3. Apply statistical methods 2	3.1 Knowledge and calculation involving theory of estimation is performed as per the procedure 3.2 Pearson's and spearman's correlation coefficients are calculated as per the procedures 3.3 Coefficients (slope and constant) of ***simple linear regression*** are calculated as per the procedures 3.4 Estimation, forecasting or prediction in linear regression is performed as per the predictor values. 3.5 Confidence intervals for regression parameters is performed as per the procedure. 3.6 Test for significance of the models and goodness of fit is done as per the procedure 3.7 Demonstrate knowledge of use of alternative measures to determine goodness of for a regression model. 3.8 Calculate and interpret coefficient of determination (R^2) for the regression model as per the procedure. 3.9 Demonstrate knowledge of multiple linear regression as per the concept. 3.10 Demonstrate knowledge and use of ***logistic regression*** in data analysis as per the concept. 3.11 Confidence intervals are calculated as per the procedures 3.12 Demonstrate knowledge Rejection criteria in hypothesis testing as per the procedure. 3.13 Demonstrate use of contingency tables to determine critical values as per the procedure. 3.14 Decisions involving rejection and failure to reject the null hypotheses is determ as per the procedure 3.15 Test for normality and heteroscedasticity is performed as per the procedure. 3.16 Comparison (Testing for equality) for the means of two independent groups is done as per the procedure. 3.17 Comparison of variances from two groups is performed as per the procedures.

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	3.18 Comparison of two sample proportions is done as per the procedures. 3.19 Calculations involving one sample and two sample Wilcoxon tests in non-parametric tests is performed as per the procedure. 3.20 Designs one way and two experiments as per the procedure

4. Apply statistics for business	4.1 Calculations involving simple index numbers is performed as per the procedures 4.2 Simple aggregative, weighted aggregative and Index of weighted average is calculated as per the procedure. 4.3 Knowledge in special issues and problems in constructions of index numbers is demonstrate as per the index numbers 4.4 Knowledge of time series data is demonstrated as per the procedure 4.5 Trend, seasonal and irregular components of time series data are determined as per the procedures 4.6 Forecasting using time series data is performed as per the procedures 4.7 Demonstrate knowledge of definitions in economics as per the concept 4.8 Calculations involving quantity demanded and quantity supplied is performed as per the procedure 4.9 Use of matrix method in calculations involving quantity demanded and quantity supplied as per the procedure. 4.10 Knowledge and calculations statistical quality control is demonstrated as per the procedures. 4.11 Sampling and measurements is industrial production is done as per workplace procedure. 4.12 Control limits in an industrial quality control is determined as per the procedure. 4.13 Control charts are generated as per the data 4.14 Demonstrate professional ethics and customer service in statistical consulting as per the procedures. 4.15 Demonstrate knowledge statistical consulting as per the industry 4.16 Demonstrate knowledge of professional ethics and customer service in statistical consulting is done as per the industry standard.

RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

	Range *May include but not limited to:*
• Simple linear regression	• $y = a + bx$
• Parameter estimates	• Slope • constants
• Probability Distributions	• Binomial • Poisson • Normal • Exponential

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Logical thinking
- Problem solving
- Drawing graphs
- Communication skills

Required knowledge

The individual needs to demonstrate knowledge of:

- Data presentation
- Data compilation
- Data organisation
- Measures of dispersion
- Measures of central tendency
- Types of data
- Parameter and statistic
- Sampling procedures
- Sampling distributions

- Probability theory
- Probability distributions
- Moments and moments generating functions
- Central limit theorem
- Theory of estimation

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1.Critical aspects of Competency	**Assessment requires evidence that the candidate:** 1.1 Demonstrate data collection tools and data collection 1.2 Demonstrate data presentation techniques 1.3 Demonstrate data organisation techniques 1.4 Carry out calculations involving measures of central tendency and dispersion 1.5 Demonstrate knowledge of sampling and sampling procedures 1.6 Carry out calculations involving sampling distributions 1.7 Obtain coefficients if simple linear regression 1.8 Demonstrate knowledge of multiple linear regression 1.9 Carry out calculation involving confidence intervals and test of hypothesis 1.10 Designs a one way and two-way experiment 1.11 Carry out calculation confidence intervals and test of hypothesis 1.12 Demonstrate knowledge and calculation involving index numbers 1.13 Carry out calculation involving time series 1.14 Carry out statistical quality control 1.15 Carry out calculations involving central limit theorem

	1.16 Carry out calculations involving probability distributions 1.17 Carry out calculations involving moments and moments generating functions
2. Resource Implications	The following resources should be provided: Access to relevant workplace or appropriately simulated environment where assessment can take place: 2.1 Measuring equipment for an industrial quality control 2.2 Data sets 2.3 Computer 2.4 Statistical Software 2.5 Stationary
3.Methods of Assessment	Competency in this unit may be assessed through: 3.1 Practical Tests 3.2 Oral Questioning 3.3 Written tests
4.Context of Assessment	Competency may be assessed 4.1 On- job 4.2 Off-Job 4.3 During Industrial attachment
5.Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.