STATISTICAL TECHNIQUES

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

Relationship to Occupational Standards

This unit addresses the unit of competency: Apply Statistical Techniques

Duration of Unit: 200 hours

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.

Summary of Learning Outcomes

1. Apply statistical concepts
2. Apply statistical methods 1
3. Apply statistical methods 2
4. Apply statistics for business

Learning Outcomes, Content and Suggested Assessment Methods

Learning outcome	Content	Suggested assessment methods

1. Apply statistical concepts	• Definitions
	  ◦ Branches
	  ◦ Types of statistics
	  ◦ Importance of statistics
	  ◦ Limitation of statistics
	• Terms and symbols in statistics
	• Levels of measurements
	  ◦ Nominal
	  ◦ Ordinal
	  ◦ Likert
	  ◦ Ratio
	• Data collection
	  ◦ Sources of data
	  ◦ Methods of data collection
	• Data organisation
		• Written tests
		• Oral questioning
		• Assignments
		• Supervised exercises

	• Classification • Tabulation • Data presentation • Histogram • Frequency tables • Pie charts • Bar charts • Line graphs • Polygons • Data compilation • Data clean-up • Checking response level • Editing raw data • Disseminating raw data • Measures of central tendency • Mean • Mode • Median • Measures of dispersion • Range • Quartiles • Percentiles • Variance • SD • Skewness • Kurtosis	
2. Apply statistical methods 1	• Elementary probability theory • Definition of probability • Laws of probability • Permutation and Combination • Expectation variance and S.D • Population and sample • Statistics • Parameter • Sampling procedures • Techniques • Types	• Written tests • Oral questioning • Assignments • Supervised exercises

	• Central limit theorem
	• Sampling distribution
	  • Distribution of sample mean
	• Probability distributions
	  • Discrete
	  • Binomial
	  • Poisson
	  • Continuous
	  • Normal
	  • Exponential
	• Mathematical expectation
	  • Moments
	  • Moments generating functions	

3. Apply statistical methods 2	• Theory of estimation
	• Statistical inference
	  • Introduction
	  • Normality test
	  • Test for heteroscedasticity
	  • One sample mean
	  • n < 30
	  • n is greater than or equal to 30
	  • Comparing two variances
	  • Comparing two independent group means
	  • Wedge sample test
	  • Pooled variance
	  • Comparing two dependent sample means
	  • One sample proportion
	  • Two sample proportion
	  • Contingency tables
	  Chi-square statistics
	  • Non-parametric
	  • One sample Wilcoxon test
		• Assignments
		• Oral questioning
		• Supervised exercises
		• Written tests

	• Two sample Wilcoxon test (Man Whitney test)
	• Confidence intervals and hypothesis testing (reference to statistical tables)
	• Correlation
	  • Pearson's
	  • Spearman's
	• Regression analysis
	  • Simple linear regression
	  • Scatter plots
	  • Regression Parameter Estimates
	  • Test of hypothesis on the regression parameters
	  • Confidence intervals on regression parameters
	  • ANOVA for simple linear regression
	  • Goodness of fit
	  • Coefficient of determination
	  • Alternative measures for the goodness of fit e.g. AIC
	  • Prediction of response variable
	  • Model validation
	  • Multiple linear regression
	  • Variable selection
	  • Introduction to regression with binary or count response variable (GLMs)
	  ➢ Logistic
	• Experimental design
	  • One way	

	• Two way	

4. Apply statistics for business	• Index numbers
	  • Introduction
	  • What are index number s?
	  • Uses of index numbers
	  • Types of index numbers
	  • Simple index numbers
	  • Composite index numbers
	  • Simple aggregative price/quantity index
	  • Index of average price/quantity relatives
	  • Weighted aggregative price/quantity
	  • Index of weighted average of price/quantity relatives
	  • Test of adequacy of index numbers
	  • Special issues in the construction of index numbers
	  • Problems of constructing index numbers
	• Time series
	  ✓ time series data
	  ✓ Components of time series
	  ✓ Application of time series
	• Introduction to economic statistics
	  • Definitions
	  • GDP
		• Written tests
		• Oral questioning
		• Assignments
		• Supervised exercises

	• GNP • National income equation • Demand and supply • Quantity demanded • Quantity supplied • Applications • Matrix • Statistical quality control Control charts Control limits Sampling plans • Statistical consulting Professional ethics Customer service	

Suggested Methods Instructions

- Group discussions
- Demonstration by trainer
- Exercises by trainee

Recommended Resources

- Scientific Calculators
- Rulers, pencils, erasers
- Graph books
- Teaching aids (Dice, coins, cards etc.)
- Computers with internet connection
- Datasets
- Projector
- Statistical Software
- White board
- White board marker