<table>
<tr><td>1.</td><td colspan="5">Name of Course</td><td colspan="2">Probability and Statistics</td></tr>
<tr><td>2.</td><td colspan="5">Course Code</td><td colspan="2">CMTH2504</td></tr>
<tr><td>3.</td><td colspan="5">Name(s) of academic staff</td><td colspan="2"></td></tr>
<tr><td>4.</td><td colspan="5">Rationale for the inclusion of the course/module in the programme</td><td colspan="2">Faculty
This module provides fundamental tools in probability and statistics which are necessary for the understanding of other modules in the program.</td></tr>
<tr><td>5.</td><td colspan="5">Semester and Year offered</td><td colspan="2">2/2</td></tr>
<tr><td rowspan="3">6.</td><td>Total Student Learning Time (SLT)</td><td colspan="4">Face to Face</td><td>Total Guided and Independent Learning</td></tr>
<tr><td rowspan="2">L = Lecture
T = Tutorial
P = Practical
O= Others</td><td>L</td><td>T</td><td>P</td><td>O</td><td rowspan="2">Independent = 84
Total =126</td></tr>
<tr><td>42</td><td>14</td><td></td><td></td></tr>
<tr><td>7.</td><td colspan="5">Credit Value</td><td colspan="2">4</td></tr>
<tr><td>8.</td><td colspan="5">Prerequisite (if any)</td><td colspan="2">CMT0101 Discrete Mathematics</td></tr>
<tr><td>9.</td><td colspan="7">Objectives:
• Provide an introduction to probability;
• Provide an introduction to the analysis of data and statistical modelling;
• Provide an introduction to the use of a statistical computing package. Such as SPSS and SAS.</td></tr>
<tr><td>10.</td><td colspan="7">Learning outcomes:
By the end of the subject, students should be able to:

• Handle of random variables and be familiar with common distributions.
• Identify fallacious reasoning in statistical reports.
• Apply mathematical tools in the analysis of problems in probability or statistics and to carry out an analysis of a data set using exploratory and formal methods.
• Apply the concepts of estimation and testing of hypothesis.
• Apply the concepts of regression analysis in other scientific disciplines.
• Apply the concepts of ANOVA techniques and its applications</td></tr>
<tr><td>11.</td><td colspan="7">Transferable Skills:
• construct probabilistic models appropriate to a problem described in words
• Explain in words the results of probabilistic or statistical analysis having regard to the situation being modelled.</td></tr>
</table>

12. **Teaching-learning and assessment strategy**

A variety of teaching and learning strategies are used throughout the course, including:

- Classroom lessons. Lectures and Power Point presentations
- Laboratory sessions: Practice exercises
- brainstorming;
- student-Lecturer discussion
- collaborative and co-operative learning;
- Independent study.

Assessment strategies include the following:

- Ongoing quizzes
- Midterm tests
- Assigned exercises,
- Lecturer Observation

13. **Synopsis:**

This module provides fundamental tools in probability and statistics. The module aims to enable the students to carry out an analysis of a data set using exploratory and formal methods, and to calculate probabilities and handle random variables. The major areas of study include: discrete/continuous random variables and probability distributions, random samples, estimation, tests of hypotheses, analysis of variance and regression and correlation.

14. **Mode of Delivery:**

Class Lectures and tutorials sessions

15. **Assessment Methods and Types:**

The assessment for this course will be based on the following:

Coursework **50%**

- Quizzes 15%
- assignments 15%
- Mid-Semester Exam 20%

50% Final Examination

100%

16. **Mapping of the course/module to the Programme Aims**

A1	A2	A3	A4	A5	A6	A7	A8	A9
4	0	0	0	3	1	1	2	0

17. **Mapping of the course/module to the Programme Learning Outcomes**

LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8	LO9	LO10	LO11	LO12
5	0	0	0	0	0	1	2	4	0	1	0

18. **Content outline of the course/module and the SLT per topic**

	Details	SLT			
		L	T	Indep.	Total
Topic 1	**PROBABILITY.** Sample Spaces and Events. Axioms, Interpretations, and Properties of Probability. Counting Techniques. Conditional Probability. Independence.	**3**	**1**	**6**	**10**

	Topic 2	**DISCRETE RANDOM VARIABLES AND PROBABILITY DISTRIBUTIONS.** Random Variables. Probability Distributions for Discrete Random Variables. Expected Values of Discrete Random Variables. The Binomial Probability Distribution. Hypergeometric and Negative Binomial Distributions. The Poisson Probability Distribution **CONTINUOUS RANDOM VARIABLES AND PROBABILITY DISTRIBUTIONS**. Continuous Random Variables and Probability Density Functions. Cumulative Distribution Functions and Expected Values. The Normal Distribution. The Exponential and Gamma Distribution. Other Continuous Distributions. Probability Plots.	**9**	**3**	**18**	**30**
	Topic 3	**JOINT PROBABILITY DISTRIBUTIONS AND RANDOM SAMPLES.** Jointly Distributed Random Variables. Expected Values, Covariance, and Correlation. Statistics and Their Distributions. The Distribution of the Sample Mean. The Distribution of a Linear Combination. **Estimation** Point Estimation: Bias and unbiased estimator; principle of minimum variance unbiased estimation; Method of moment; Maximum Likelihood estimation.	**6**	**2**	**12**	**20**
	Topic 4	**STATISTICAL INTERVALS BASED ON A SINGLE SAMPLE.** Basic Properties of Confidence Intervals. Large-Sample Confidence Intervals for a Population Mean and Proportion. Intervals Based on a Normal Population Distribution. Confidence Intervals for the Variance and Standard Deviation of a Normal Population. **TESTS OF HYPOTHESES BASED ON A SINGLE SAMPLE.** Hypothesis and Test Procedures. Tests About a Population Mean. Tests Concerning a Population Proportion. P-Values. Some Comments on Selecting a Test.	**6**	**2**	**12**	**20**
	Topic 5	**INFERENCES BASED ON TWO SAMPLES.** z Tests and Confidence Intervals for a Difference Between Two Population Means. The Two-Sample t Test and Confidence Interval. Analysis of Paired Data. Inferences Concerning a Difference Between Population Proportions. Inferences Concerning Two Population Variances.	**3**	**1**	**6**	**10**
	Topic 6	**THE ANALYSIS OF VARIANCE.** Single-Factor ANOVA. Multiple Comparisons in ANOVA. More on Single-Factor ANOVA. **MULTIFACTOR ANALYSIS OF VARIANCE.** Two-Factor ANOVA with Kij = 1. Two-Factor ANOVA with Kij > 1. Three-Factor ANOVA. 2p Factorial Experiments.	**3**	**1**	**6**	**10**
	Topic 7	**SIMPLE LINEAR REGRESSION AND CORRELATION.** The Simple Linear Regression Model. Estimating Model Parameters. Inferences About the Slope Parameter â1. Inferences Concerning μY-x* and the Prediction of Future Y Values. Correlation. **NONLINEAR AND MULTIPLE REGRESSION.** Aptness of the Model and Model Checking. Regression with Transformed Variables. Polynomial Regression. Multiple Regression Analysis. Other Issues in Multiple Regression.	**6**	**2**	**12**	**20**

	Topic 8	**GOODNESS-OF-FIT TESTS AND CATEGORICAL DATA ANALYSIS.** Goodness-of-Fit Tests When Category Probabilities are Completely Specified. Goodness of Fit for Composite Hypotheses. Two-Way Contingency Tables.	**3**	**1**	**6**	**10**
	Topic 9	**DISTRIBUTION-FREE PROCEDURES.** The Wilcoxon Signed-Rank Test. The Wilcoxon Rank-Sum Test. Distribution-Free Confidence Intervals. Distribution-Free ANOVA.	**3**	**1**	**6**	**10**
		Total contact hours	**42**	**14**	**84**	**140**
19.	**Main references supporting the course:** • Jay L. Devore . Probability and statistics for engineering and the sciences, 7th Edition. Duxbury Pr. 2008					
	Additional references supporting the course: • John J. Kinney. A Probability and Statistics Companion. John Wiley and Sons Ltd, July 2009, • Larsen, R.J. and Marx, M.L. An Introduction to Mathematical Statistics and its Applications, 4th Edition. Prentice Hall, 2006					
20.	**Other additional information** All materials will be available to the students online.					