Multivariate Data Analysis (MSM4274)

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<tr><td>Course Code</td><td colspan="9">MSM4274</td></tr>
<tr><td>Course Name</td><td colspan="9">Multivariate Data Analysis</td></tr>
<tr><td>Credit Hour</td><td colspan="9">4</td></tr>
<tr><td>Prerequisite Course</td><td colspan="9">Industrial Statistics (MSM4213)</td></tr>
<tr><td rowspan="3">Contact Hours</td><td colspan="3">Lecture:</td><td>3</td><td>units</td><td colspan="4">(3 hour(s) per week)</td></tr>
<tr><td colspan="3">Tutorial:</td><td>0</td><td>unit</td><td colspan="4">(0 hour(s) per week)</td></tr>
<tr><td colspan="3">Laboratory:</td><td>2</td><td>units</td><td colspan="4">(2 hour(s) per week)</td></tr>
<tr><td>Rationale for the Inclusion</td><td colspan="9">The problem arise in physical phenomena are widely involve multivariate data analysis since multivariate data analysis is a central tool whenever many variables need to be considered at the same time. It is the extension of common univariate statistical procedures to analogous multivariate techniques that involve several dependent variables. Hence, this course is designed to strengthen the fundamental knowledge of multivariate data analysis which lead to understanding to the real problem in life.</td></tr>
<tr><td>Course Objective</td><td colspan="9">This course will give students a solid methodological background in Multivariate Data Analysis as a backbone of Applied Statistics. Students will learn the theoretical foundations of the most commonly applied multivariate techniques such as mean vector and covariance matrix estimation, MANOVA, principal component analysis, factor analysis, canonical correlation analysis, discriminant analysis and cluster analysis. Students will study the properties and the importance of the multivariate normality assumption in the context of each of these methods. At the end of the course, students should be able to use all the above techniques for practical analysis of real datasets.</td></tr>
<tr><td>Course Synopsis</td><td colspan="9">The course covers multivariate methods such as principal components, factor analysis, MANOVA, discriminant analysis, logistic regression, canonical correlation and cluster analysis. An introduction to matrix algebra and multivariate normal distribution theory are also discussed. The multivariate methods will be applied to solve industrial problems such as identifying the significant parameters in multivariate quality control, dominance pattern in multivariate data and allocation rule to classify multivariate data using Matlab or R Language.</td></tr>
<tr><td rowspan="2">Program Outcomes</td><td>PO1</td><td>PO2</td><td>PO3</td><td>PO4</td><td>PO5</td><td>PO6</td><td>PO7</td><td>PO8</td><td>PO9</td></tr>
<tr><td>/</td><td>/</td><td>/</td><td></td><td>/</td><td></td><td></td><td></td><td></td></tr>
<tr><td rowspan="2">Soft Skills</td><td colspan="2">Code</td><td>CTPS</td><td>CS</td><td>TS</td><td>LL</td><td>ES</td><td>EM</td><td>LS</td></tr>
<tr><td colspan="2">KIM</td><td>2</td><td></td><td>4</td><td></td><td></td><td></td><td></td></tr>
<tr><td rowspan="4">Course Outcomes</td><td colspan="9">By the end of semester, students should be able to:</td></tr>
<tr><td>CO1</td><td colspan="8">Relate the terminologies and concepts of multivariate data analysis.</td></tr>
<tr><td>CO2</td><td colspan="8">Integrate the multivariate methods in solving various problems related to industrial sciences, technology and engineering.</td></tr>
<tr><td>CO3</td><td colspan="8">Adapt appropriate statistical software to analyse the multivariate data of the various application.</td></tr>
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	CO4	Perform the work collaboratively as part of a team to solve given problems.

Assessment Methods	**Methods**	**Weighting**	**CO1**	**CO2**	**CO3**	**CO4**	
	Test	30%	/	/	/		
	Assignment	30%		/	/	/	
	Final Examination	40%	/		/		
	Total	**100%**					

Learning References	1	Alvin C. R. and William F. C. Methods of Multivariate Analysis. 3rd Edition. John Wiley and Sons, Inc., New York. 2012. (latest version - Main Reference)
	2	Johnson, R.A. and Wichern, D.W. Applied Multivariate Statistical Analysis. 6th Edition. Prentice Hall, 2007. (latest version)
	3	Muirhead, R.J. Aspect of Multivariate Statistical Theory. John Wiley & Sons, Inc, New York. 2005.(latest version)
	4	Anderson, T. W. An Introduction to Multivariate Statistical Analysis. Third Edition. John Wiley and Sons, Inc., New York. 2003. (latest version)
	5	William R. D and Matthew Goldstein. Multivariate Analysis: Methods and Applications. John Wiley & Sons, Inc, New York. 1984. (latest version)