Operational Research (MSM4444)

<table>
<tr><td>Course Code</td><td colspan="9">MSM4444</td></tr>
<tr><td>Course Name</td><td colspan="9">Operational Research</td></tr>
<tr><td>Credit Hour</td><td colspan="9">4</td></tr>
<tr><td>Prerequisite Course</td><td colspan="9">Computational Methods in Industry (MSM4413)</td></tr>
<tr><td rowspan="3">Contact Hours</td><td colspan="3">Lecture:</td><td>4</td><td>units</td><td colspan="4">(4 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>0</td><td>unit</td><td colspan="4">(0 hour(s) per week)</td></tr>
<tr><td>Rationale for the Inclusion</td><td colspan="9">Operational Research is the application of mathematical techniques and analysis to problem solving in business and industry, in particular to carrying out more efficiently tasks such as work scheduling, job assignment, blending problem, production planning or optimising the provision of services. It is an interdisciplinary topic drawing from mathematical modelling, optimisation theory, game theory, decision analysis, statistics, and simulation to help in making decisions in complex situations. Hence, this course is designed to enhance the student’s abilities to develop mathematical model and algorithms, solve and analyse industrial problems. Topic covered may help the decision makers to design, improve and operate complex systems in the best possible way.</td></tr>
<tr><td>Course Objective</td><td colspan="9">To equip students with the concepts of operational modelling methods for analysing and solving applied related problems using the available software such as LINGO, TORA and C++.</td></tr>
<tr><td>Course Synopsis</td><td colspan="9">This course covers a selection of mathematical tools and models for operational research, in particular, linear programming, integer programming, network models and queuing theory to solve industrial problem such as work scheduling, job assignment, blending problem, production planning or optimising the provision of services. Besides the computation of the method, theory underlying the problems and methods are also discussed. Besides manual calculations, students learn how to use available software such as LINGO, TORA and C++ to solve and analyze industrial problems.</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></td><td>5</td><td>4</td><td></td><td></td><td></td><td></td></tr>
<tr><td rowspan="5">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">Formulate linear programming problem, integer programming problem, network problems and queuing problem to solve the selected industrial problems.</td></tr>
<tr><td>CO2</td><td colspan="8">Construct the mathematical models for the selected industrial problems from economic point of view and find the optimal solution(s) of the dual problem based on the model and optimal solution of the primal.</td></tr>
<tr><td>CO3</td><td colspan="8">Recommend the new solution(s) for the selected industrial problems, if any changes affecting feasibility and optimality occur to the original problem by using the information from the optimal primal simplex tableau.</td></tr>
<tr><td>CO4</td><td colspan="8">Perform the works collaboratively as part of a team to solve given problem.</td></tr>
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	CO5	Communicate effectively in written and oral form through group discussion (assignment) and presentation.

Assessment Methods	**Methods**	**Weighting**	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**
	Project (Case Study)	40%	/	/	/	/	/
	Test	20%	/	/	/		
	Final Examination	40%	/	/	/		
	Total	**100%**					

Learning References	1	Winston, Wayne L., Operations Research: Applications and Algorithms 4th Edition, Duxbury Press. 2003. (latest version- Main Reference)
	2	Taha, Hamdy A., Operations Research: An Introduction 9th Edition, Prentice Hall. 2010.(latest version)
	3	Hillier F., Introduction to Operational Research 9th Edition, McGraw-Hill. 2009.(latest version)
	4	K. G. Murty, Case Studies in Operations Research: Applications of Optimal Decision Making, Springer. 2015.
	5	Michele C., Gerard C. and Giacomo Z, Integer Programming, Springer. 2014.