Computational Methods in Industry (MSM4413)

<table>
<tr><td>Course Code</td><td colspan="9">MSM4413</td></tr>
<tr><td>Course Name</td><td colspan="9">Computational Methods in Industry</td></tr>
<tr><td>Credit Hour</td><td colspan="9">3</td></tr>
<tr><td>Prerequisite Course</td><td colspan="9">None</td></tr>
<tr><td rowspan="3">Contact Hours</td><td colspan="3">Lecture:</td><td>2</td><td>units</td><td colspan="4">(2 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">Usually students are well-grounded in the fundamental of mathematics but lacking in particular extensions of integrating the mathematical methods in Microsoft Excel by using Visual Basic for Applications (VBA) (the most frequently used software in industry). This course is offered to give exposure for mathematicians and industrial practitioners on how to incorporate the mathematical knowledge and algorithms in Microsoft Excel by using VBA and subsequently develop a Graphical User Interface (GUI) so that can facilitate industry to solve their problems.</td></tr>
<tr><td>Course Objective</td><td colspan="9">To create the powerful Microsoft Excel applications by using Visual Basic for Applications (VBA) for selected industrial problems.</td></tr>
<tr><td>Course Synopsis</td><td colspan="9">This course is designed to develop students skills in computational methods in industry using Visual Basic for Applications (VBA) for creating the tools in Microsoft Excel of selected industrial problems. The topics include computing and problem solving techniques in VBA, data acquisition and real time in VBA, Monte-Carlo simulation in VBA, graph and trees, cost benefit analysis and microeconomics. Various real-world applications in industry will be covered such as shortest path methods for logistics planning. The emphasis of this course is on learning in a practical context that students will learn to apply and manipulate algorithms in Microsoft Excel and design a Graphical User Interface (GUI) in Microsoft Excel via VBA.</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>6</td><td></td><td></td><td></td><td>3</td><td>2</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">Organize various computational approaches in solving real industrial problems. (C5)</td></tr>
<tr><td>CO2</td><td colspan="8">Summarize the output in VBA and prepare the recommendations for the selected industrial problems (C6)</td></tr>
<tr><td>CO3</td><td colspan="8">Manipulate objects such as workbooks, worksheets, range of cells in Microsoft Excel to work with large collections of data (P5)</td></tr>
<tr><td>CO4</td><td colspan="8">Design the Graphical User Interface (GUI) in Microsoft Excel via VBA to solve the industrial problems. (P7)</td></tr>
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| | **CO5** | Perform the professional skills and ethical values in writing the technical reports. (A5) | | | | | |
| **Assessment Methods** | **Methods** | **Weighting** | **CO1** | **CO2** | **CO3** | **CO4** | **CO5** |
| | Assignment/Project | 70% | / | / | / | / | / |
| | Test | 30% | / | | | / | |
| | **Total** | **100%** | | | | | |

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| **Learning References** | 1 | Green, J., Bullen, S., Bovey, R., Alexander, M. (2007). Excel 2007 VBA Programmer's Reference. (Latest version-Main Reference for Chapter 1) |
| | 2 | Walkenbach, J. (2007). Excel 2007 Power Programming with VBA. (Latest version) |
| | 4 | Akran Najjar, (2017). Practical Monte Carlo Simulation with Excel: Part 1 (Basics and Standard Procedures) |
| | 6 | Rosen K.H (2011) Discrete Mathematics & Its Applications, McGraw-Hill (Seventh Edition). (Latest version) |
| | 7 | Boardman, E.A., Greenberg, D.H., Vining, A.R. and Weimer, D.L. 2010, Cost–benefit analysis: concepts and practice, 4th edition, Pearson Prentice Hall, New Jersey. (Latest version-Main Reference for Chapter 4) |