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|  **Syllabus Mathematical Programming**

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| **Catalog Description** | Modeling in operation research, linear programming, transportation and assignment problems,  |
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| **Objectives** | This is an introductory course on operations research designed for junior level with interest in industrial engineering that will give them the essential tools of operations research to enable them model and make scientifically based decisions production environments. |
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| **Learning Outcomes** | 1. Formulate LP problems.
2. Solve LP problems by Simplex method.
3. Formulate and solve the transportation and assignment problems.
4. inventories Scheduling EOQ
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| Topics | Number of lectures |
| [Introduction to operations research](http://faculty.kfupm.edu.sa/SE/salamah/operations_research_I/introduction_to_operations_research.pdf) Operations research techniques,  | 1 |
| [Linear programming formulation and graphic solution](http://faculty.kfupm.edu.sa/SE/salamah/operations_research_I/linear_programming_formulation_and_graphic_solution.pdf) Models of mathematical operations research, art of modeling, construction of the LP model, graphical LP solution | 1 |
| [The Simplex method](http://faculty.kfupm.edu.sa/SE/salamah/operations_research_I/Simplex_method.pdf) Standard LP form, basic solution, The Simplex method using matrix | 1 |
| [Transportation, assignment, and transshipment models](http://faculty.kfupm.edu.sa/SE/salamah/operations_research_I/transportation_assignment_transshipment_models.pdf) Definition of the transportation model, determination of a starting solution, the transportation algorithm, definition of the assignment and salesman problem, the [Hungarian method](http://en.wikipedia.org/wiki/Hungarian_method). | 1 |

 Prerequisite: Knowledge of operations with matrix and differential calculus  References:1. Lecture notes
2. H. Taha, Operations Research: an introduction
3. [Hilier and Liebermann, Introduction to Operations Research, McGraw-Hill](http://www.mhhe.com/engcs/industrial/hillier/)
4. [Wayne Winston, Operations Research: Applications and Algorithms, Duxbury Press](http://www.amazon.com/Operations-Research-Applications-Algorithms-InfoTrac%C2%AE/dp/0534380581)

 **Method of assessment: none**

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|  **Computer usage** | Students will utilize the PC to illustrate the usage of Lindo and Gams software to solve LP problems.  Hence, basic knowledge of matrix is required. |

 **Practice:*** [Linear programming method practice](http://faculty.kfupm.edu.sa/SE/salamah/operations_research_I/simplex_method_practice_1.pdf)

 Computer tutorials, Carrying the simplex method in Lindo and Gams* [Tutorial to Lindo and Gams Solver for the Solution of Linear Programming Models](http://faculty.kfupm.edu.sa/SE/salamah/mis/tutorial_to_excel_solver.htm)
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