General Information:

Name of Course: **MATHEMATICAL MODELLING; (OPERATIONS RESEARCH)**

Course Code: PMTRTNM703HA
Semester: 2th
Number of Credits: 5
Allotment of Hours per Week: 4 Lessons /Week
Evaluation: Exam
Prerequisites: -

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Introduction, Learning Outcomes:
This course introduces some of the basic concepts in operations research and quantitative analysis. Students gain a working knowledge of decision theory, the process and techniques of making decision, operations research techniques that are used extensively in organizations to solve large, structured problems. Coverage includes the use of optimization (linear, integer, and non-linear programming) models, network models in developing optimal solutions to operational and strategic problems in modern organizations.

This course introduces students to the importance and use of mathematical models to formulate and develop optimal solutions to structured problems. Therefore, the most important competencies addressed by this course include critical, logical and analytical thinking skills. Students develop both the conceptual basis and the practical skills in problem solving. Secondly, formulating and solving complex mathematical models necessarily require the use of computers. Therefore, students are able to strengthen their computing skills.

General Course Description and Main Content:
In this course, students learn:
1. To develop an understanding of and facility in mathematical modeling of structured and semi-structured problems.
2. To gain a working knowledge of OR techniques as problem solving and decision support tools.
3. To be able to interpret solutions and perform sensitivity analysis on these solutions.
4. To strengthen skills in the use of computers and software to perform analyses involving OR techniques.

Methodology:
The course is based on classroom lectures, discussions, demonstrations and individual work of students.

Schedule:
The rough outline of the schedule is as follows:
Week 1-3:
- A. Introduction to Decision theory and Operations Research (OR)
  1. What is Decision Theory, process of decision
  2. Importance of OR in developing optimal solutions
  3. Making Decision, type of decisions
  4. Decision making under complete uncertainty (MiniMax, MaxiMin,MaxiMax, Hurwicz, etc.)
  5. Decision Trees
  6. Types of Business Problems suitable for OR solution
  7. Introduction to Modeling

Week 4-7:
- B. Optimization techniques for resource allocation
  1. Linear programming
     a. Graphical analysis

b. Simplex algorithm
c. Modeling in spreadsheets
d. Sensitivity analysis
2. Integer and binary integer programming
3. Transportation and assignment models

Week 8: **Midterm Exam**
Week 9: Spring holiday
Week 10-14:

C. Network optimization models
1. Shortest path
2. Minimum cost
3. Maximum flow
4. PERT/CPM

Week 15: **Final Exam**

Lesson Culture:
The course is based on collaboration, participation and practice trough lessons. This is an interaction between Students and Faculty; used the teaching methods like 'Problem-based learning' and 'learning-by-doing'.

Attendance:
Attending is required all classes, and will impact the grade (max. 5%). Unexcused absences will adversely affect the grade, and in case of absence from more than 30% of the total number of lesson will be grounds for failing the class. To be in class at the beginning time and stay until the scheduled end of the lesson is required, tardiness of more than 20 minutes will be counted as an absence. In the case of an illness or family emergency, the student must present a valid excuse, such as a doctor's note.

Evaluation + Grading
The Course grade is determined as a combination of 1 midterm exam (45%), a final exam (50%) and attendance of lessons (5%).

1. All exams are closed-book and closed-notes. A student with a proper excuse of being absent from the examination must inform and get a permission from the teacher prior to the time of examination. Any students who do not take the examination at the scheduled time will receive a zero score.

Grading Scale:

Numeric Grade:	5	4	3	2	1
Evaluation in points:	89%-100%	77%-88%	66%-76%	55%-65%	0-54%

Course grade (exams) correction between: 17-25 May, 2016

PTE Grading Policy:
Information on PTE's grading policy can be found at the following location:

Students with Special Needs:
Students with a disability and needs to request special accommodations, please, notify the Deans Office. Proper documentation of disability will be required. All attempts to provide an equal learning environment for all will be made.

Readings and Reference Materials:
Required:
Wayne L. Winston, *Operations Research, Applications and Algorithms*, 4th Edition, 2004

ISBN: 0534423620 (International Student Edition)
(You can borrow from the University Library of Pécs and Centre for Learning)

Alternative Textbooks:
Fred S. Hillier and Mark S. Hillier; *Introduction to Management Science: A Modeling and Case Study Approach*, McGraw-Hill, 2nd Edition, 2002
ISBN: 0072833475