I. REQUIRED TOPICS

1. Introduction

1. What is Decision Problem? Which are its components and goals?
2. What is the difference between Data Mining and Decision Support?
3. What are Decision Sciences?
4. What is the difference between Decision Sciences and Decision Systems?
5. Explain the difference between Normative and Descriptive approach to Decision Science. What are their typical sub-disciplines and approaches?
6. What is Decision Support? What can it offer to decision makers? Give examples of typical approaches and techniques.
7. Which types of decision problems are there? Give examples for each problem type.
8. Explain the difference between different decision problems:
   a. Easy (routine, everyday) vs. Difficult (complex)
   b. One-Time vs. Recurring
   c. One-Stage vs. Sequential
   d. Single Objective vs. Multiple Objectives
   e. Individual vs. Group
   f. Structured vs. Unstructured
   g. Tactical, Operational, Strategic
9. What are the characteristics of complex decisions?
10. What is the difference between Decision and Decision Process?
11. Define Decision Support Systems? Which types of DSS are there?
12. What is Operations Research?

2. Decision Analysis

13. What is Decision Analysis?
14. Explain the concept of Evaluation Model. What are these models used for?
15. Which types of models are typical for Decision Analysis?
16. Which are the main stages of the decision making process?

3. Decision-Making under Uncertainty

17. What is a decision table?
18. What is a payoff matrix?
19. What is the difference between decision making under uncertainty and under risk?
20. Describe decision criteria for decision making under uncertainty?
21. Describe decision criteria for decision making under risk?
22. Explain each of the decision criterion and compare it with others: Dominance, Pessimistic, Optimistic, Hurwicz’s, Laplace’s, Regret, Expected Value.
23. What is sensitivity analysis? Why is it important?
4. Decision Trees

24. What is a decision tree?
25. Which components constitute a decision tree?
26. Compare decision table and decision tree.
27. How are decision trees solved?
28. How do decision trees handle the concept of time?
29. What is the value of perfect information? How do we obtain it from a decision tree?
30. What is a risk profile?

5. Multi-Attribute Models

31. What is the motivation for using multi-attribute (multi-criteria) models?
32. What is a multi-attribute model?
33. Which components constitute a multi-attribute model?
34. What is an attribute?
35. What is a value function?
36. What is an option?
37. What is a preference?
38. What are the characteristics, and what is the difference between quantitative and qualitative multi-attribute models?
39. Why do we talk about hierarchical multi-attribute models?
40. What are the characteristics of hierarchical models?
41. Why are multi-attribute models so useful?
42. Which are the typical stages of multi-attribute model development?
43. Which are the three strategies for developing attribute structure?
44. Which are the criteria for selection and composition of attributes?

6. Kepner-Tregoe method

45. What is the Kepner-Tregoe (K-T) method? Which are its characteristics?
46. Explain the advantages and disadvantages of using K-T.
47. What types of decision problems are suitable for K-T?

7. AHP

48. What is AHP? Which are its characteristics?
49. How are attributes and option values compared in AHP?
50. In AHP, how do we define:
   a. attribute weights,
   b. option values (preferences, scores)?
51. What kind of value aggregation is used in AHP?
52. What types of decision problems are suitable for AHP?
53. Summarize the advantages and disadvantages of AHP.
54. Compare AHP with DEX.

8. DEX and DEXi

55. Which are the main characteristics of the DEX method?
56. What is DEXi?
57. Which are the typical stages of working with DEXi?
58. Which are the strategies and ‘rules of thumb’ for creating a tree of attributes with DEXi?
59. What kind of attribute scales are used in DEXi? How should we create scales?
60. What are decision rules?
61. Which are the possible approaches to define decision rules in DEXi?
62. How are options described in DEXi?
63. How are options evaluated by DEXi?
64. How does DEXi handle incomplete information (missing decision rules, incomplete option data)?
65. What types of analyses can be performed in DEXi?
66. Which components may constitute a DEXi report?
67. What kind of charts can be produced in DEXi?
68. What kind of data can be exported from DEXi and how?
69. Which types of decision problems are suitable for DEXi?
70. Summarize the advantages and disadvantages of DEX.

II. OPTIONAL TOPICS

9. Influence Diagrams

71. What is an influence diagram?
72. Which components constitute an influence diagram?
73. What is the meaning of arcs in influence diagrams?
74. Compare decision tree and influence diagram.
75. What is the motivation for using influence diagrams instead of decision trees?
76. Can influence diagrams handle multi-criteria decision problems?

10. Software

77. Which computer programs can deal with:
   a. decision tables,
   b. decision trees,
   c. influence diagrams,
   d. multi-attribute models?
78. What is their typical functionality?
79. What is the functionality of Web-HIPRE? Which methods does it provide for:
   a. dealing with a tree of attributes
   b. designing utility functions
   c. evaluation and analysis of options.

III. ADVANCED TOPICS

11. Value functions

80. Explain the difference between quantitative and qualitative evaluation models.
81. Which types of aggregation functions are used in quantitative models?
82. Explain differences between the aggregation in quantitative and qualitative models.

12. Data Mining and Decision Support

83. Explain the basic ways and types of DM-DS integration.
84. What is model revision?
85. Can we create DEX models from data?