

# Computer Methods in Decision Making

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## Topic outline

*Part of 'Υπολογιστικές  
Μέθοδοι Λήψης Αποφάσεων'*

Teacher: Jan Jantzen

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 [Announcements](#)

 [Progress table](#)

### 1 Introduction

Preparation

- no preparation

Material

- Samsø renewable energy production, [flashmap](#).
- Jantzen J (Ed) 2010 *Appraisal of Renewable Energy Projects at Samsø*. Samsø Energy Agency, [Wiki pages](#).
- Jantzen J 2011 *Samsø: Renewable Energy Island Project (1997 - 2007)*. Samsø Energy Agency, [PDF slides](#) 2.0 MB
- Larson J 2009 *Island in Denmark produces more energy than it consumes*, Worldfocus, series Green Energy in Denmark, [Video](#) 6 mins.

### 2 Fuzzy Set Theory

Learning objectives





- to understand how fuzzy set theory is an expansion of set theory
- to recognize common fuzzy sets and give examples

Calendar ▾

◀ July 2011 ▶

Mon	Tue	Wed	Thu	Fri	Sat	Sun
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

Events Key

 Global	 Course
 Group	 User

Preparation:

- Read [logic.pdf](#), sections 1 - 2
- See supporting slides ([FuzLogic.pdf](#) 0.75 MB)

 [Assignment 2](#)

### 3 Fuzzy Logic

Learning objectives

- to develop a fuzzy logic from fuzzy sets
- to explain fuzzy implication and inference
- to propose implementations of fuzzy logic operations
- to show examples of computer intelligence

Preparation

- Read the rest of [logic.pdf](#), sections 3 - 5
- See supporting slides ([FuzLogic.pdf](#) 0.75 MB)

 [Fuzzy Logic Quiz \(all students do this solo\)](#)

### 4 Non-Technical Barriers

Learning objectives

- to define non-technical barriers
- to perform your own barrier analysis
- to understand the calculation of willingness to invest
- to explain the role of fuzzy logic and fuzzy inference

Preparation

- Read *Non-Technical Barriers* ([barriers.pdf](#) 0.1 MB)
- Slides *Non-Technical Barrier Analysis* ([FuzNTB.pdf](#) 0.6 MB)

- Download the NTB questionnaire ([NTBCheckChios.xls](#) 0.03 MB)

#### Feedback

- Results from the NTB assignment ([FuzNTB\\_Results2011.pdf](#) 0.1 MB)

 [Assignment 4](#)

## 5 Payback Period and Interest

### Learning objectives

- to calculate payback period and internal rate of return for a project
- to set up a cumulative cash flow diagram for decision support

### Preparation

- Read *Introductory Case: Energy Saving Lamp* ([wiki page](#))
- Read *Cash Flow* ([wiki page](#))
- Read *Net Present Value* ([wiki page](#))
- Read *Internal Rate of Return* ([wiki page](#))
- Supporting slides *Economic Project Appraisal* ([PDF 0.2 MB](#))
- Download spreadsheet *Class A light bulbs* ([FigLamps.xls](#))

 [Assignment 5](#)

## 6 Case: Ground Heat

### Learning objectives

- to apply engineering economics to a real project
- to examine the economic viability of ground heat and its sensitivity

- to learn the Excel model well enough for your own future use

#### Preparation

- Read *Ground Heat in a Private Residence* ([wiki page](#))
- Supplementary slides *Economic Appraisal of a Private Ground Heat Pump* ([ModGroundheat.pdf](#) 2.2 MB)
- Download the file [ModGroundheat.xls](#) (0.05 MB)

 [Assignment 6](#)

### 7 Case: Home Energy Efficiency

#### Learning objectives

- to explain the *energy signature* of a house
- to construct a linear model
- to explain the difference between training data and test data
- to validate a model

#### Preparation

- Read the page *Energy Efficiency in a Home* ([wiki page](#))
- Read slides *Home Energy Efficiency* ([ModEfficiency.pdf](#) 0.9 MB)
- Download the file *Case: Home Energy Efficiency* ([ModEfficiency.xls](#))

 [Assignment 7](#)

### 8 Case: Biogas Plant

#### Learning objectives

- to perform an economic appraisal

- to describe a barrier analysis

#### Preparation

- none

#### Material

- *Samsø South Biogas Plant (proposal)* ([wiki page](#))
- *Appraisal of a Biogas Project at Samsø* ([PDF slides](#) 0.7 MB)
- Spreadsheet *FigBiogas.xls* ([XLS](#) 0.04 MB)

### 9 Local Ownership

#### Learning objectives

- to explain and discuss ownership models and financing methods

#### Preparation next year

- Read *Paludans Flak Wind Turbine* ([wiki page](#))
- Slides *Local Ownership* ([PDF](#) 0.68 MB)
- Spreadsheet [FigPaludans.xls](#)

### 10 Final Test

It will be after the end of the course, and it will include the material of Kyrie Ampazis as well. It will be multiple choice, and it will be graded.

My questions will fall within the following study material.

1. Jantzen J (2008) *Tutorial on Fuzzy Logic*, lecture note [logic.pdf](#), all pages
2. *Fuzzy Sets and Fuzzy Logic* ([slides FuzLogic.pdf](#) 0.75 MB)
3. Jantzen J (2010) *Non-Technical Barriers*, lecture

note [barriers.pdf](#), all pages

4. *Non-Technical Barrier Analysis* ([slides FuzNTB.pdf](#) 0.6 MB)
5. *Introductory Case: Energy Saving Lamp* ([wiki page](#))
6. *Cash Flow* ([wiki page](#))
7. *Net Present Value* ([wiki page](#))
8. *Internal Rate of Return* ([wiki page](#))
9. *Economic Project Appraisal* ([slides PDF](#) 0.2 MB)
10. *Ground Heat in a Private Residence* ([wiki page](#))
11. *Economic Appraisal of a Private Ground Heat Pump* ([slides ModGroundheat.pdf](#) 2.2 MB)
12. *Energy Efficiency in a Home* ([wiki page](#))
13. *Home Energy Efficiency* ([slides ModEfficiency.pdf](#) 0.9 MB)

11 Not available

12 Not available

13 Not available

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