INSTITUT NATIONAL DES SCIENCES APPLIQUÉES LYON

DPT GENIE CIVIL ET URBANISME
CIVIL ENGINEERING AND URBANISM
INSA Campus LyonTech - 8 rue des Sports
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Engineering methods

Decision support - 1

IDENTIFICATION

CODE : GCU-3-S2-EC-AD1
ECTS : 2.0

HOURS

Lectures :	10.0 h
Seminars :	20.0 h
Laboratory :	0.0 h
Project :	0.0 h
Teacher-student contact :	30.0 h
Personal work :	20.0 h
Total :	50.0 h

ASSESSMENT METHOD

project(s) (25% of the evaluation) + 1 final examination (2h) (75% of the evaluation)

TEACHING AIDS

Course material given during the lessons + Digital documents available

TEACHING LANGUAGE

French

CONTACT

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AIMS

This module is part of the course unit GCU-S6-OUTILS-2 (Tools for Engineers) and contributes to:

Competences in Engineering Science:
A1- Analyze a real or virtual system (or problem)(Level 2)
A2- Operate a model of a real or virtual system(Level 2)
A5- Process data (Level 3)
A6- Communicate a scientific analysis or approach (Level 2)

Competences in Humanities, Documentation and Physical and Sports Education:
B2- Work, learn, progress autonomously (Level 2)
B3- Interact with others, work as a team (Level 2)
B5- Act responsibly in a complex world(Level 1)

Competences specific to the speciality:
C25- Contribute to design and describe sustainable urban planning and constructions(level 1)
C26- Manage (essess, maintain) existing structures and facilities (level 1)

Allows the student to work and be evaluated on the following knowledge:
- Fundamentals of decision theory (A1, A5, C25, C26)
- Optimization methods(A2, C25, C26)
- Multicriteria decision-aid methods(A5, A6, C25, C26)

Allows the student to work and be evaluated on the following abilities:
- choose and apply an optimization method (A5, C26,B2)
- choose and apply a multicriteria decision-aid method with critical distance : aggregation approach, multi-criteria decision analysis approaches including ELECTRE II, ELECTRE III and ELECTRE TRI (A2, A6, C25, C26, B2, B3, B5)

CONTENT

1. Introduction and overall concepts: Systems and Decision, Decision theory models, criterion definition and preference modelling

2. Multivariate optimization methods

3. Life cycle assessment - LCA

4. Multicriteria decision-aid methods (MCDA)
4.1. Two approaches: aggregate and compare vs compare and aggregate
4.2. Definition of weighting factors in MCDA
4.3. Aggregation methods
4.4. Outranking methods using true criteria (ELECTRE II), pseudo criteria (ELECTRE III and Tri)
4.5. Problem setting, choice and implementation of methods on real life problems

BIBLIOGRAPHY

Bruen, M., Maystre, L.Y., Rogers, M.G. (2000). ELECTRE and decision support. Methods and applications in engineering and infrastructure investment. Kluwer Academic Publishers,224 p.
Pomerol, J.C., Barba-Romero, S. (2000). Multicriterion Decision in Management Principles and Practice. Springer Science + Business Media New York, 389p.
Roy, B. (1996). Multicriteria methodology for decision aiding. Dordrecht (The Netherlands): Kluwer Academic Publishers, 292p.
Vinke,P. (1992). Muticriteria decision-aid. Chichester (England): John Wiley & Sons, 154 p.

PRE-REQUISITE

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