Decision Making

Code: 44760
ECTS Credits: 9

2025/2026

Degree	Type	Year
Logistics and Supply Chain Management	OB	1

Contact

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Teaching groups languages

You can view this information at the end of this document.

Prerequisites

None

Objectives and Contextualisation

Along a supply chain hundreds and thousands of individual decisions have to be made and coordinated every minute. These decisions are of different importance. They comprise the rather simple question "Which job has to be scheduled next on a respective machine?" as well as the very serious task whether to open or close a factory. The more important a decision is, the better it has to be prepared. This preparation is the job of planning in its widest sense. Planning supports decision-making by identifying alternatives of future activities and selecting some good ones or even the best one. Planning can be subdivided into the phases:

- recognition and analysis of a decision problem,
- definition of objectives,
- forecasting of future developments,
- identification and evaluation of feasible activities (solutions), and finally
- selection of good solutions.

Supply chains are very complex. Not every detail that has to be dealt with in reality can and should be respected in a plan and during the planning process. Therefore, it is always necessary to abstract from reality and to use a simplified copy of reality, a so-called model, as a basis for establishing a plan. The "art of model building" is to represent reality as simple as possible but as detailed as necessary, i. e. without ignoring any serious real world constraints.

The main objective of this subject is to introduce quantitative methods and optimization techniques aimed to help the planning activities and, therefore, to support the decision making process. These methods are based in the use of formal models and their corresponding solving techniques. The student will learn how to model the system and its decision making process and then how to apply the methods and techniques to select the optimal solutions. Basic case studies representing typical problems (e.g. planning, scheduling, distribution or routing) are used in the learning process.

Learning Outcomes

1. CA04 (Competence) Develop arguments based on optimisation models and quantitative techniques.
2. CA05 (Competence) Systematise, document and reflect on problem-solving and decision-making processes in order to identify the lessons that have been learned.
3. CA06 (Competence) Gather and formulate the main aspects involved in solving decision-making challenges by deciphering the decision variables and limitations, and proposing a solution.
4. KA07 (Knowledge) Identify the principal methods and techniques that support decision making.
5. KA08 (Knowledge) Model the system in relation to the decision-making process.
6. SA07 (Skill) Analyse, structure and propose mechanisms to identify and solve a decision-making problem with logistics systems.
7. SA08 (Skill) Select and apply the appropriate methodologies and strategies to design a solution to a decision-making problem in LCSM.
8. SA09 (Skill) Evaluate and compare alternatives in order to find a solution and evaluate hypotheses by combining intuition and analytical methods to identify the best option.

Content

THEORY

DM.T.1: Introduction to Decision Making:

- DM in LSCM:
  - SCM modeling
  - Advanced Planning
- Quantitative methods
  - Planning and scheduling
  - Forecasting

DM.T.2: Optimization methods:

- Linear and integer programming
- Constraint programming
- AI methods

DM.T.3: Production planning:

- Types of constraints
- Modeling structures

DM.T.4: Optimization of scheduling problems:

- Job sequencing
- Resource allocation
- Job and resource scheduling

DM.T.5: Heuristics and evolutionary methods:

- Introduction to evolutionary algorithms
- Heuristics in planning problems

DM.T.6: Heuristics and evolutionary methods

- Heuristics in Transport Planning

PROBLEMS

DM.P.1: Examples:

- Demand forecasting
- Production mix

DM.P.2: MILP modeling exercises

DM.P.3: Production planning models

DM.P.4: Production scheduling models

DM.P.5: Distribution: warehouses & inventory

DM.P.6: Transport network models

PRACTISE

DM.L.1: Introduction to OPL:

- S/W installation
- IDE overview

DM.L.2: OPL:

- MILP programming
- CP programming

DM.L.3: Productionplanning

DM.L.4: Production planning

DM.L.5: Heuristics and evolutionary methods

- Introduction to HeuristicLab
- Solving Job Shop Scheduling Problem in HeuristicLab

DM.L.6: Solving Transport and VRP problems

SEMINARS

Management Information Systems in Business: Role of IT in modern business

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Problem sessions	8.5	0.34	

Seminars	10	0.4
Theory lectures	31.5	1.26
Type: Supervised		
Practise sessions	18	0.72
Type: Autonomous		
Personal study	50	2
Problem solving and report writing	107	4.28

The course is organized by means of traditional lectures combined with seminars. The learning process will combine the following activities:

- Theory lectures
- Problem sessions
- Practise sessions: computer lab
- Teamwork and oral presentation
- Autonomous work

Practical case studies and optimization tools are used for promoting students hand on skills.

Use of Generative Artificial Intelligence Tools - Policy Statement

This subject acknowledges the increasing role of generative artificial intelligence (AI) as a support tool in academic work. Accordingly, the use of such tools is permitted on a limited basis, strictly for enhancing the formal aspects of student submissions. Acceptable uses include improving writing quality, style, clarity of exposition, linguistic accuracy, and translation, as well as obtaining occasional technical assistance.

However, the use of generative AI to create the substantive content of assessed work is strictly prohibited. This includes, but is not limited to: the development of methodological approaches, the design or execution of experiments, the analysis or interpretation of results, the formulation of ideas, and the drafting of conclusions. These tasks must be carried out entirely by the student, as they constitute the essential intellectual and creative contributions required to successfully complete the subject.

Students are required to explicitly declare the use of any generative AI tools in each submitted piece of work. This declaration must include:

- The specific tools used
- The purpose for which they were used
- The extent of their contribution

Excessive, irresponsible, or unnecessary use of such tools may negatively affect the final grade. Any undeclared or inappropriate use of generative AI may result in failure of the subject.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Assessment

Continous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
B1-Introduction to IT project	10%	0	0	KA07, SA09
B2-Planning & Scheduling practical cases	70%	0	0	CA04, CA05, CA06, KA07, KA08, SA07, SA08, SA09
B3-Heuristics practical cases	20%	0	0	KA07, KA08, SA09

a) Scheduled evaluation process and activities

The subject does not have written exams. The evaluation is based on the different works presented during the semester.

The submission deadlines for the different reports will be published in the moodle classroom of the virtual campus since the very beginning of the semester. Deadlines are subject to possible reschedules in case of unforeseen events. The Virtual Campus is the only channel to communicate the most updated schedule, since it is assumed that this is the only platform for exchanging this sort of information between faculty and students.

b) Programming evaluation activities

The schedule of the regular evaluation activities will be published on the virtual campus at the early beginning fo the semester. Dates for retaking process will be published at the examination section of the School of Engineering website.

c) Retaking process

In accordance with the Academic Regulations of the UAB, participating in retaking process requires the student to have been previously evaluated in the set of evaluation activities, the weight of which is equivalent to a minimum of two thirds of the total grade of the subject or module.

Practice work can't be retaken and must be submitted within the specified deadlines.

An Assay course work failed in the first instance can be recovered on the examination date set by the programme coordination. Re-taking will consist in the presentation of the corrected work according to the indications received by the professor. In this case, as long as the work meets the MINIMUM requirements, the work will be graded with a 5.

d) Procedure to review qualifications

For each evaluation activity, a place, date and time in which the student can review the activity with the teacher will be indicated. The faculty responsible for the subject will assess the presented complaints regarding the awarded grade. The student can complain in the given date, but the activity will not be reviewed later.

e) Qualifications

The final grade will be calculated from the assessment of the following evaluation activities:

B1: Small project report related to the introduction to IT seminars (10%).

B2: Combines an Assay (50%) or small project (team work) and the solution reports (20%) of four practical exercises (individual work) in the field of Planning & Scheduling, where MILP and CP optimization methods are used to solve the problems.

B3: Solution reports of two cases where heuristics methods are used to solve the problem (20%).

In order to average all the evaluation activities, the mark of each of them must be above 4 points (out of 10). All the report-based activities must be submitted within the due dates specified by the professor. If a report-based activity is failed, the student will be asked to re-submit its report according to the corrections/indications provided by the professor.

If any of the components of the evaluation has a value lower than 4, the qualification will be Fail

The Assay qualification (belong to B2) has two components:

- Overall evaluation of the work (90% of the mark). Both the report and the developed project will be evaluated.
- Oral defense (10% of the mark): Teacher's assessment during the oral presentation.

Granting a distinction grade is the decision of the subject faculty. The regulations ofthe UAB indicate that distinctions may be awarded to students who have obtained a final grade equalor greater than 9.00. Distinction awards cannot exceed 5% of enrolled students.

The rating of "Assesment not possible" (Not Submitted) will be obtained only if no evaluation activity is delivered.

f) Irregularities by the student, copy and plagiarism

Without prejudice to other disciplinary measures deemed appropriate, and in accordance with current academic regulations, any irregularity committed by the student, which could lead to an alteration of the evaluation act, will be scored with a zero. Therefore, copying or allowing to copy a practice or any other activity spoiling the evaluation will imply failing with a zero, and if the activity is required to pass the subject, the whole course will be failed. The evaluation activities qualified in this way and by this procedure will not be recoverable, and therefore the subject will be failed directly without the opportunity to retaking it in the same academic year.

g) Evaluation of students retaking the whole subject

Those students retaking the whole subject must follow the same evaluation activities as for the first time.

Bibliography

Hartmurt Stadlert and Cristoph Kilger (Eds.) *Supply Chain Management and Advanced Planning*. Third Edition. Springer, 2005. (Electronic version available at the university library)

Ioannis T. Christou. *Quantitative Methods in Supply Chain Management. Models and Algorithms*. Springer, 2012. (Electronic version available at the university library)

H. Paul Williams. *Model Building in Mathematical Programming*. Wiley. 2013 (5th edition) Further readings

Joseph Geunes, Panos M. Pardalos and H. Edwin Romeijn (Eds.) *Supply Chain Management: Models, Applications, and Research Directions*. Kluwer Academic Publishers, 2002. (Electronic version available at the university library)

F. Robert Jacobs, William L. Berry, D. Clay Waybark and Thomas E. Vollmann. *Manufacturing Planning and Control for Supply Chain Management*. McGraw-Hill, 2011 (6th edition)

F. Robert Jacobs and Richard B. Chase. Operation*s and Supply Chain management*. McGraw-Hill Irwing, 2011 (13 th edition)

Other relevant literature can be provided during the lecturing period.

Software

During the course we will use the IBM ILOG optimization platform that you can install on your computers.

How to get the ILOG Student Edition platform (When starting the course):

https://www.ibm.com/products/ilog-cplex-optimization-studio?mhsrc=ibmsearch_a&mhq=ilog

Register on the platform with your email address @ e-campus.uab.cat

Groups and Languages

Please note that this information is provisional until 30 November 2025. You can check it through this link. To consult the language you will need to enter the CODE of the subject.

Name	Group	Language	Semester	Turn
(PAULm) Classroom practices (master)	10	English	first semester	morning-mixed
(PLABm) Practical laboratories (master)	10	English	first semester	morning-mixed
(TEm) Theory (master)	10	English	first semester	morning-mixed