

Subject	Description
Algorithms	
Algorithms - Exact	Exact algorithms return an optimal solution.
Algorithms - Heuristics	Heuristics are designed to solve optimization problems fast (at least faster than exact methods) without having the proof of the solution being optimal.
Combinatorial optimization	
Combinatorial Optimization - Location problems	Given a set of demand points and a set of candidate facility sites with costs of building facilities at them, the goal is to select a subset of sites to built facilities. Costs are incurred for servicing demand points from these facilities. The objective is to minimize the sum of facility costs and the sum of the service costs for the demand points.
Combinatorial Optimization - Networks and graphs - Network flows	This problem consist of sending flow through a network from supply points to demand points at minimal cost. The allowed flows are restricted by the given capacities of the edges in the network. This category also includes matching, spanning trees and shortest path problems.
Combinatorial Optimization - Networks and graphs - Stochastic	These are network and graph problems that include stochastic components.
Combinatorial Optimization - Networks and graphs - Vehicle routing	The vehicle routing problem (VRP) is a combinatorial optimization problem seeking to service (with one or multiple commodities) a number of customers with a fleet of vehicles. The Travelling Salesman Problem (TSP) is the special case, where only one vehicle is considered.
Combinatorial Optimization - Scheduling - Parallel machine scheduling	Parallel machine scheduling is the process of assigning jobs to a given number of machines. Additionally, the jobs have to be sequenced on the machines in such a way that a given performance measure is optimized.
Combinatorial optimization - Scheduling - Shop problems	In the shop scheduling problem, a number of jobs and machines is given. Each job has to be processed on all machines, where the order in which the jobs have to be processed by the machines can be chosen arbitrarily or can be fixed. The jobs are scheduled in such a way that a given performance measure is optimized.
Combinatorial optimization - Scheduling - Single machine scheduling	Single machine scheduling is the process of arranging tasks on one machine in such a way that a given performance measure is optimized.
Combinatorial optimization - Scheduling - Stochastic scheduling	These are scheduling problems that include stochastic components.
Computational complexity	Computational complexity theory focuses on classifying problems according to their inherent difficulty.
	Methods for scoping a decision-making problem, clearly representing it, decomposing it into elements, establishing criteria, evaluating the options, and recommending a decision to a decision maker. Examples are probability assessment under uncertainty, decision trees, value of information, utility theory, and multiple-agent contexts, Analytical Hierarchy Process (AHP).
Decision analysis	
Decision support systems	A specifically designed computer program or software used to support decision making. The software is intended for managers and/or staff members. This category will often be used in conjunction with another.
Dynamic programming	Technique to solve a multidimensional optimization problem, by transforming the problem into a sequence of single-stage problems
Dynamic programming - Deterministic decision processes	DP in which the current state and current decision surrices to determine the new state and the costs during the current stage
Dynamic programming - Stochastic decision processes	DP in which current costs and/or next state are random variables, dependent on current state and current decision
Economics	
Economics - Econometrics	The application of statistical and mathematical methods in the field of economics to describe the numerical relationships between key economic forces such as capital, interest rates, and labor.
Economics - Performance measurement	The process of comparing business processes and performance metrics, such as cost, cycle time, productivity or quality. It helps to understand what the relative position of an entity's performance is. A frequently used method is Data Envelopment Analysis (DEA), where entities are called Decision Making Units (DMUs), and one or more performance metrics are compared through Linear Programming (LP).
Forecasting	The process of predicting (future) values of random variables
Forecasting - Judgemental methods	Judgemental forecasting methods incorporating intuitive judgements, opinions and subjective probability estimates (for example: Delphi method).
Forecasting - Regression	Technique used to estimate mathematical models to find a mathematical expression that best fits the relationship between a group of random variables as indicated by a sample of data.
Forecasting - Time series	Time series methods which use historical data as the basis of estimating future outcomes (for example: Moving average).
Functions and equations	
Game theory	A mathematical method of decision-making in which a competitive situation is analyzed to determine the optimal course of action
Game theory - Bidding and auctions	Games where players act in auction markets
Game theory - Cooperative	Games where the players are able to form binding commitments
Game theory - Noncooperative	Games where players make decisions independently
Inventory models	Inventory models are concerned with the design of inventory systems to minimize costs. It studies the decisions faced in connection with warehousing, supply chains, spare part allocation, etc.
Maintenance models	Maintenance models are concerned with the design of maintenance systems to minimize costs or maximize availability. It studies the decisions faced in connection with maintenance, refurbishing, replacing machines, availability, failure risk, system risk, etc.
Mathematical programming	
Mathematical programming - (Mixed) Integer	Mathematical optimization program where (some of) the unknown variables are required to be integer.
Mathematical programming - Linear	Linear programming (LP) is the problem of optimizing a linear objective function, subject to linear equality and inequality constraints.
Mathematical programming - Nonlinear	Nonlinear programming (NLP) is a mathematical optimization program where the objective function or (some of) the constraints are nonlinear.
Mathematical programming - Stochastic	Stochastic programming is a framework for modeling optimization problems that involve uncertainty.
Petri nets	A Petri net (also known as a place/transition net or P/T net) is one of several mathematical modeling languages for the description of discrete distributed systems. A Petri net is a directed bipartite graph, in which the nodes represent transitions (i.e. discrete events that may occur, signified by bars), places (i.e. conditions, signified by circles), and directed arcs (that describe which places are pre- and/or postconditions for which transitions, signified by arrows).

Probability	A way of expressing knowledge or belief that an event will occur or has occurred.
Probability - Markov processes	A mathematical model for the random evolution of a memoryless system, i.e. a system for which the likelihood of a given future state at any given moment, depends only on its present state and not on any past states.
Probability - Renewal processes	A nonnegative integer-valued stochastic process that registers the successive occurrences of an event during the time interval $(0,t]$, where the times between consecutive events are positive iid random variables (source: Taylor & Karlin)
Probability - Stochastic models	Application of a mathematical model with at least one random variable that does not fall in the categories Markov Processes or Renewal Process
Project management	Project management is the discipline of planning, organizing, and managing resources to bring about the successful completion of specific project goals and objectives. Examples tools include Critical Path Method (CPM), Program Evaluation and Review Technique (PERT) and Gantt-charts.
Queueing theory	The mathematical study of waiting lines
Queueing theory - Multiple server queue	Queueing model with multiple servers
Queueing theory - Networks of queues	Systems which contain a finite number of queues. Customers, sometimes of different classes, travel through the network and are served at the queues.
Queueing theory - Single server queue	Queueing model with a single server
Simulation	A computer simulation model attempts to simulate an abstract model of a particular system.
Simulation - Agent-based models	An agent-based model (ABM, a.k.a. multiple-agent system) simulates the actions and interactions of autonomous entities (agents) to assess their effects on the system as a whole. The autonomy of the involved entities is the crucial element of ABM. ABM agents may experience learning, and an ABM usually comprises of: numerous agents, decision-making heuristics, learning rules, interaction topologym, and a non-agent central environment. Example software includes: NetLogo, SeSAm and AnyLogic.
Simulation - Discrete event simulation	DES software simulates a system while updating the state space in discrete time intervals corresponding to events in the system. The state of the system is changed by an occurring event, and an event can trigger a certain decision. Example software includes, Arena, ProModel/MedModel, Tecnomatix Plant and SIMUL8.
Simulation - Monte carlo methods	Monte Carlo Methods rely on repeated random sampling to evaluate the dynamics of a system. Monte Carlo Methods in mathematics are used to solve problems by generating suitable random numbers and observing that fraction of the numbers which obeys some property. Typically this is done without standard simulation software.
Simulation - System dynamics	System Dynamics simulates a system by updating the state space continuously. It deals with feedback loops and flows, such that the relation between individual components is equally or more important than the individual components. Example software includes, iThink, STELLA, Dynamo, PowerSim and Vensim
Statistics	Mathematical methods pertaining to the collection, analysis, interpretation or explanation, and presentation of data.
Statistics - Distribution comparison	
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