1- Optimization problems and the search space

2- Main principles of metaheurstics, neighborhood, movements, exploration operator, population metaheuristics

3- The space of permutations

4- Complexity and the need for metaheuristics, exploration versus exploitation

5- Random search, random walk, hill climbing

6- NK-problems: motivation, definition, goal.

7- Tabu Search: main principles and convergence

8- The different ways to implement the tabu list.

9- Quadratic Assignment Problems

10- Simulated annealing, main principles and the Metropolis rule

11- Simulated annealing, flow chart and choice of parameters

12- Convergence of simulated annealing: how to formulate it, how to compute it.

13- Ant-like algorithms: swarm intelligence, the pheromone trail, and observations about real ants.

14- Ant System: description of the algorithm for the TSP problem

15- Ant algorithms: the simple version in {0,1}^N, and discussion of performance

16- Particle Swarm Optimization: algorithm and example

17- The Firefly algorithm

18- Genetic algorithms: inspriration and algorithm.

19- The different selection operators

20- The takeover time in genetic algorithms: goal, definition, value for tournament selection.

21- Genetic Programming: goal, fitness evaluation, function and terminal sets

22- Genetic Programming: tree representation, initialization, crossover, mutation, and bloat.

23- Genetic Programming: the stack-based, instruction-driven representation.

24- Evolution Strategy: individual and population versions.

25- Performance of metaheuristics: examples, specificities of the performance evaluation, metrics, approach, "No Free Lunch" theorem.

26- Phase transition in optimization problems: problem description and properties.

27- Phase transition in optimization problems: the RWSAT algorithm and its behavior.

28- The parallel tempering.