PONTIFICAL CATHOLIC UNIVERSITY OF RIO DE JANEIRO

CENTRE OF SCIENCE AND TECNOLOGY

DEPARTAMENT OF INDUSTRIAL ENGINEERING

IND 2097 SPECIAL TOPICS IN OPERATIONS RESEARCH: ADVANCED TOPICS IN DISCRETE OPTIMIZATION

TOTAL HOURS: 45 HOURS CREDITS: 3 – CRITERIA 12

TIME: MONDAYS – 09h TO 12h ROOM: LABORATORY

REQUIREMENT(S): Basic knowledge in programming and linear programing

GOALS

Provide concepts and techniques for solving discrete optimization problems. To this end, techniques available in the literature will be presented through lectures focusing on theoretical aspects and computational characteristics. The methods presented in the classes will be developed in practice by the students as a form of evaluation.

SYLLABUS

Solution methods: Introduction to complexity. Divide-and-conquer. Greedy method. Enumeration. Dynamic programming. Problems in graphs: Searches. Shortest path. Minimal spanning tree. Maximum flow. Minimal cost flows. Multiple commodity flow problems. Hard problems: Timetabling problems. Scheduling problems. Routing problems. Clustering problems. Algorithms: Branch-and-bound. Cutting planes. Column generation. Danzig-Wolfe decomposition. Benders decomposition. Lagrangian relaxation.

PROGRAM

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BIBLIOGRAPHY

Dasgupta, Papadimitriou, e Vazirani. Algorithms, McGraw-Hill Education.
Ahuja, Magnanti, e Orlin. Network Flows, Pearson.

ADDITIONAL REFERENCES

Wolsey. Integer Programming, Wiley-Interscience.
Nemhauser, e Wolsey. Integer and Combinatorial Optimization, Wiley.