UNIVERSIDADE FEDERAL DE LAVRAS
PRÓ-REITORIA DE PÓS-GRADUAÇÃO
COORDENADORIA DE PÓS-GRADUAÇÃO *STRICTO SENSU*

DISCIPLINA

Código	Denominação	Crédito(s) (*)	Carga Horária		
			Teórica	Prática	Total
	Linear and Integer Programming	4	60	0	60

DEPARTAMENTO	PROFESSOR(ES)
Departamento de Ciência da Computação (DCC)	Dilson Lucas Pereira Mayron César de Oliveira Moreira

EMENTA: (Síntese do Conteúdo)

Linear programming. Graphical solution of linear programs. Linear algebra and convex analysis. The Simplex Method. Duality and sensitivity analysis. Mixed-Integer programming. Relaxations and bounds. Well solved problems. Branch-and-Bound. Cutting planes.

(*) 15 horas/aulas teóricas = 1 crédito
15 horas/aulas práticas = 1 crédito

ASSINATURA(S): _____

_____

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Aprovado na Assembléia Departamental em _____/_____/_____

_____
Chefe do Departamento

Lavras, _____/_____/_____

CONTEÚDO PROGRAMÁTICO

1. Linear Programming
1.1. The Linear Program
1.2. Linearity hypotheses: additivity, proportionality, divisibility and certainty
1.3. Classic formulations: the diet problem, the transportation problem, production planning problems, cutting and packing problems

2. Graphical solution of linear programs
2.1. Drawing two dimension feasible search regions (polytope)
2.2. Characterizing feasible regions
2.3. Finding optimal solutions by analysis of the gradient vector and function level curves

3. Linear Algebra and Convex analysis
3.1. Vectors and Matrices
3.2. Convex sets and convex functions
3.3. Polyhedral sets and cones
3.4. Extreme points, directions, extreme directions, faces
3.5. General representation theorem

4. The Simplex Method
4.1. Extreme points and optimality
4.2. Basic feasible solutions
4.3. The Simplex Method
4.4. Two-phase method
4.5. Big-M method
4.6. The Simplex Method in tableau format

5. Duality and Sensitivity Analysis
5.1. The Dual Problem
5.2. Primal-Dual relationships
5.3. Sensitivity analysis
5.4. The Dual Simplex Method

6. Mixed-Integer Programming
6.1. The Mixed-Integer Program
6.2. Classic formulations: The assignment problem, the knapsack problem, the set covering problem, the traveling salesman problem
6.3. Alternative, good and ideal formulations

7. Relaxations and bounds
7.1. Optimality and relaxations
7.2. The linear programming relaxation
7.3. Combinatorial relaxations
7.4. Lagrangian relaxation
7.5. Upper bounds

8. Well solved problems
8.1. Easy problems
8.2. Properties of easy problems
8.3. Dynamic programming
8.4. Complexity classes and reductions

9. Branch-and-bound
9.1. The branch-and-bound algorithm

10. Cutting planes
10.1. Valid inequalities
10.2. Gomory's Cuts
10.3. Mixed-Integer cuts

10.4. Other types of cuts

BIBLIOGRAFIA BÁSICA

Bazaraa, M., Jarvis, J. e Sherali, H., Linear Programming and Network Flows, 2nd edition, Wiley, 684 p., 1990.

Luenberger, D.G. e Ye, Y., Linear and nonlinear programming. Springer, 546 p., 2008.

Wolsey, L. A. Integer programming. John Wiley & Sons, 1998.

BIBLIOGRAFIA COMPLEMENTAR

Arenales, M. N., Armentano, V. A., Morabito, R. e Yanasse, H. H., Pesquisa Operacional, Editora Campus/Elsevier, 2ª edição, ISBN 85-352-1454-3, Rio de Janeiro, 2015, 723p.

Bertsimas, D. e Tsitsiklis, J.N., Introduction to linear optimization. Athena Scientific, 608p., 1997.

Chvatal, V., Linear Programming. W. H. Freeman, 478p. 1983.

Vanderbei, R. J., Linear Programming – Foundations and Extensions, Series: International Series in Operations Research & Management Science , Vol. 114, 464 p., 2008.

Computers & Industrial Engineering.

Computers & Operations Research.

European Journal of Operational Research.

International Journal of Production Research.

Journal of Heuristics.

Mathematical Programming.

Networks.

Omega.