Web page
https://www.maths.uwa.edu.au/Units link for MATH2224

See this page for credit, availability, content, assessment, prerequisites, and links to on-line resources.

Lecturers
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More on assessment
Assessment will comprise an exam worth 70% and continuing assessment of 30% made up of 20% assignments and 10% for a short test. Assignments will be about once every two weeks with some questions assessed. There will be one short test held during lecture times, most likely in week 8. Assignments may be submitted jointly by at most three people. Group assignments must include the following statement:

This assignment is the work of the undersigned, all of whom have made a significant contribution to all of the assignment.

This statement must be followed by the name, student number and signature of the contributing people. (Working as a group means working together on all the questions, it does not mean each member does one question.)

You should also be aware of the University policies and penalties for plagiarism.

Calculators
Calculators will be permitted in exam and tests, but are probably of little help.

Books
There is not a text book for the unit, but material is covered by two books:
D.G. Luenberger, Introduction to linear and nonlinear programming, Addison-Wesley.

Both of these books have several editions, and I am not sure of the differences between editions. I think I have a first edition of Luenberger and a 6th edition of Hillier and Lieberman.

If you are intending to do a Major in Operations Research, then buying Hillier and Lieberman is a good idea. It covers most of the material in both 2nd year and 3rd year units.

Hillier and Lieberman is more general and has good examples and nice background reading. Luenberger is more technical.

The Co-op bookshop has in stock the following book, which is also suitable reference.
Outline
Order and content may vary slightly from that stated below.

- Introduction (2 lectures)
  - Introduction to linear programs (convexity?)
  - Basic terminology and notation of linear programs
  - Mention of nonlinear
  - Modelling
  - Examples: Resource allocation, Termite Enterprises.

- Scheduling (6 lectures)
  - Minimum and Maximum completion time, Compatibility. (Bridge building)
  - Batch processing (Traffic lights)
  - CPM, Normal and Crash time squeezing

- LP and Simplex Method (11 lectures)
  - Convexity
  - Simplex Algorithm - canonical (standard) form - tableaux representing constraints
    - pivoting to maintain feasible solution. - cost as a constraint - pivoting to decrease cost - termination conditions - cycling, reference to anti-cycling.
  - Method of Artificial variables
  - Sketch of interior point (Karmakar Algorithm)

- Game Theory (3 lectures)
  - Conflicting objectives
  - Zero-sum games as LP

- Linear Duality (7 lectures)
  - weak (linear) duality
  - linear duality - Most results proven with respect to Simplex Tableaux - Rough treatment via Lagrangian (see nonlinear opt) - Sensitivity - primal and dual - Complementary Slackness - Dual Simplex Algorithm

- Network LP and Network Simplex (4 lectures)
  - Introduction, full algorithm exists, relations to other Network problems.
  - Transshipment problem
  - NSA for transshipment problem
  - Transportation as a version of NSA for transshipment
  - Assignment problem

- Nonlinear Optimization (6 lectures)
  - Unconstrained and constrained optimisation
  - Gradient and Lagrangian methods
  - Examples: Inventory control, Packaging