

BITS PILANI, DUBAI CAMPUS
ACADEMIC-UNDERGRADUATE STUDIES DIVISION
Second Semester 2023 – 2024
Course Handout (Part – II)

Date: 05.02.2024

In addition to part I (General Handout for all courses appended to the time table) this portion gives further specific details regarding the course.

Course No. : MATH F212 (3 0 3)
Course Title : Optimization
Instructors : Dr. Maneesha
Course coordinator : Dr. Maneesha

Scope and Objective of the Course:

An optimization problem in its simple form is one in which some entity with or without being subjected to certain constraints is minimized or maximized. The entity to be optimized may be profit, cost, time, product efficiency, consumer utility, etc. The constraints may involve manpower, availability of space, raw materials, funds, machine capabilities, governmental controls, etc. The subject of optimization is multidisciplinary in nature. Optimization Problems are encountered in physical sciences, engineering, economics, industry, planning, and many other areas of human activity. Background needed for undertaking this course is acquaintance with Calculus, Set Theory and Linear Algebra. Objective of the Course is to familiarize the student with standard methods of solving optimization problems.

Course Pre / Co- requisite: *Given in the Bulletin 2023– 2024*

Knowledge of Advanced Calculus (MATH F111, Mathematics I), Complex Variables and Linear Algebra (MATH F112, Mathematics II)

Text Book(TB):

T1: H.A.Taha, **Operations Research: An Introduction**, Pearson Education, 10th.edn, 2019.

Reference Books (RB):

R1: Pant J.C., **Introduction to Optimization: Operations Research**, Jain Brothers, New Delhi, 5th.edn, 2000.

R2: Hillier and Lieberman, **Introduction to Operations Research**, T M H, 7th.edn; 2001.

Course Plan / Schedule:

Sl.#	Learning objectives	Topics to be covered	Chapter No	No. of lectures
1	To learn how to form, solve and analyze Linear Programming Problems of two variables	Introduction to Linear Programming (LP) —Two-variable LP model, Graphical solution.	2.1, 2.2.1, 2.2.2	3
2	To learn how to solve LPP with all of more than two variables	The Simplex Method, Artificial Starting Solution, Special Cases	3.1, 3.2, 3.3, 3.4, 3.5	6
3	To learn how to form the Dual of a primal and then solve the LPP. To study different cases if changes are brought in.	Duality and Sensitivity Analysis	4.1 - 4.5	8
4	To learn how to solve Transportation and Assignment Problems	The Transportation Models and its Variants, Assignment problems	5.1,5.3, 5.4	5
5	To learn Scheduling to minimize trouble spots	Project Management with PERT/CPM	6.5	4
6	To learn the algorithm involved in solving LPP	Simplex Method fundamentals	7.1, 7.2	2
7	To study problems with Multiple Goal and Goals with priorities	Goal Programming	8.1, 8.2	2

8	To learn how to solve problems where solution set is required to be integers	Integer Programming	9.2.1	2
9	To learn how to solve problems using Principle of Optimality	Dynamic Programming	10.1, 10.2	4
10	To learn how to solve zero sum two person game of strategies	Game Theory	13.4	3
11	To learn how to solve non linear programming problems	Non-linear Programming	20.2.2, 21.2.2	3
Total number of Lectures planned:				42

Course Learning Outcomes (CLOs)

Upon successful completion of this course, students should be able to:

- **CLO1** Understand the fundamental concepts and scientific principles of optimization.
- **CLO2** Understand the linear programming problems and solve using graphical and algebraic methods.
- **CLO3** Apply the optimization techniques to solve transportation and assignment problems.
- **CLO4** Apply the project management techniques to optimize the completion times of the projects in engineering and management framework.
- **CLO5** Apply Integer, dynamic and non-linear programming to find optimal solutions.

Evaluation scheme:

E C N0	Evaluation Components	Nature of Component	Duration	Weightage	Date & Time	Venue
1	Mid Semester	Open Book	90 minutes	35 %	04.04.2024 FN	To be anno unced later
2	Quiz	Closed Book	20 minutes	15%	14.03.24 (Th7)	
2	Software Based Assignment	Open Book		10%	TBA	
3	Comprehensive Exam	Closed Book	3 hours	40 %	07.06.2024 FN	

Mapping of CLOs, PLOs, and CECs

CLOs	PLOs	Evaluation Components (ECs)			
		EC1	EC2	EC3	EC4
CLO1	1,2,3	✓	✓	✓	✓
CLO2	1,2,3	✓	✓	✓	✓
CLO3	1,2,3,5		✓	✓	✓
CLO4	1,2,3,4,5,8			✓	✓
CLO5	1,2,3,4,8			✓	✓

* Please refer the [link](#) for the PLOs of the B.E. Computer Science programme

Mid-semester Grading:

Mid-semester grading will be displayed on 25-April -2024.

Note: A student is likely to get “NC”, if he / she doesn't appear / appear for the sake of appearing for the evaluation components / scoring zero in Comprehensive examination.

Makeup and Attendance policies:

Make-ups are not given as a routine. It is solely dependent upon the genuineness of the circumstances under which a student fails to appear in a scheduled evaluation component. In such

circumstances, prior permission should be obtained from the Instructor-in-Charge (I/C). The decision of the I/C in the above matter will be final.

Attendance: Every student is expected to be responsible for regularity of his/her attendance in the classes to appear in scheduled tests and examinations and fulfill all other tasks assigned to him/her in every class. A student should have a minimum of 60% of attendance in a course to be eligible to appear for the Comprehensive Examination. For the students under the purview of Academic Counseling Board (ACB), the Board shall prescribe the minimum attendance requirement on a case-to-case basis. Attendance in the course will be a deciding factor in judging the seriousness of a student which may be directly / indirectly related to grading.

General timings for consultation: T4

General instructions:

Students should come prepared for classes and carry the text book(s) or material(s) as prescribed by the Course Faculty to the class.

Notices:

All notices concerning the course will be displayed on the GS department Notice Board.

Instructor-in-Charge

Contact details:

Dr. Maneesha, Chamber No.138, Contact No.+9714 2753788, E-mail: maneesha@dubai.bits-pilani.ac.in