Course Code	ECE 452/552
Course Name	Linear Optimisation
Credits	4
Course Offered to	UG/PG
Course Description	This course aims at introducing students to the application of optimization techniques to various areas of CSE and ECE. We will primarily focus on linear optimization (linear programming) and learn about the structural and algorithmic aspects of optimization problems. The theoretical assignments will aim at developing the necessary skills for analysing algorithms and formulation of LPs. Computational assignments will complement the theory by modeling real-world problems as linear programs and solve them using publicly available solvers. Towards the end of the course, we will briefly discuss convex programs and semi-definite programs (SDPs) with real-world applications and point to some of the existing solvers for this class of problems.

Pre-requisites

Pre-requisite (Mandatory)	Pre-requisite (Desirable)	Pre-requisite(other)
Linear Algebra	Introduction to Programming	

Post Conditions*(For suggestions on verbs please refer the second sheet)

CO1	CO2	CO3	CO4
Should be able to formulate Linear/Non-Linear optimisation problems in the standard mathematical form.	Should be able to apply algorithms/procedures like simplex and interior point methods to solve optimisation problems	Should be able to use solvers to obtain solutions to moderately sized problems and obtain optimal solutions (or lower bounds).	

Weekly Lecture Plan

Week Number	Lecture Topic	COs Met	Assignment/Labs/Tutorial
1	Linear Algebra Review	1	
2	Linear Optimisation Problems - Modeling through examples	1	HW 1: Theory
3	Geometry of Linear Programming	2	
4	Geometry of Linear Programming	1	
5	Simplex Method	2	HW 2: Coding
6	Simplex Method	2	
7	Duality Theory	2	
8	Duality Theory + Theorem of the Alternative	2	HW 3: Coding
9	Ellipsoid Method/Interior Point Methods	2	
10	Network Flow Problems	3	
11	SDP	3	HW 4: Coding
12	Integer Programming Formulations	3	
13	Overflow		

Assessment Plan

Type of Evaluation	% Contribution in Grade
Assignment	40
Quiz	0
Mid-sem	25
End-sem	35

*Please insert more row for other type of Evaluation

Resource Material

Type	Title
Textbook	Introduction to Linear Optimisation by D. Bertsimas
Textbook	