TKU213101

Optimization Methods

Teknik Optimisasi

BASIC INFORMATION

Course Credit	3 / 150 minutes per Week
Course Type	Required
Course Classification	Engineering Topics
Prerequisites	Single- and Multi-Variable Calculus; Linear Algebra

STUDENT AND LEARNING OUTCOMES

Covered Student Outcomes

Development of Engineering Solution (KP.2) Engineering Design (KP.3)

Learning Outcomes

LO1 Students are able to undertand and solve unconstrained optimization problems.

LO2 Students are able to undertand and solve linear programming problems.

LO3 Students are able to undertand and solve nonlinear constrained optimization problems.

COURSE DESCRIPTION

This course deals with analitical methods to solve optimization problems which very often appear in engineering. It studies the uncontrained optimization, linear programming, and nonlinear constrained optimization problems.

TOPICS

PART I: MATHEMATICAL REVIEW

1. Methods of Proof and Some Notation

1.1 Methods of Proof

1.2 Notation

2. Vector Spaces and Matrices

2.1 Vector and Matrix

2.2 Rank of a Matrix

2.3 Linear Equations

2.4 Inner Products and Norms

3.Transformations

3.1 Linear Transformations

3.2 Eigenvalues and Eigenvectors

3.3 Orthogonal Projections

3.4 Quadratic Forms

15.6 Minimizing Quadratics Subject to Linear Constraints

16. Problems with Inequality Constraints

16.1 Karush-Kuhn-Tucker Condition

16.2 Second-Order Conditions

17. Convex Optimization Problems

17.1 Introduction

17.2 Convex Functions

17.3 Convex Optimization Problems

17.4 Semi-definite Programming

18. Algorithms for Constrained Optimization

18.1 Introduction

18.2 Projections

18.3 Projected Gradient Methods with Linear Constraints

18.4 Lagrangian Algorithms

18.5 Penalty Methods

REFERENCES

[1] Edwin K. P. Chong, Stanislaw H. Zak., 2013., An Introduction to Optimization, 4th Edition