

# CE 551 Optimization and Design

2024-25 Fall Semester

## Instructor:

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## Time and Location:

Thursday 13.30 - 16.15 CZ17

## Course description:

Introduction to operation research. Optimization techniques such as linear programming, dynamic programming, and non-linear programming.

## Course Learning Outcomes:

- The ability to construct optimization models for engineering design problems.
- The ability to use monotonicity analysis, graphical representation, and elimination techniques jointly to examine the adequacy and find the analytical solutions of the optimization design models.
- The ability to apply optimality conditions to analytically solve unconstrained/constrained optimization problems with multiple variants and single objective function.
- The ability to apply gradient and Newton –based iterative methods to numerically solve unconstrained/constrained optimization problems with multiple variants and single objective function.
- The ability to examine the robustness of the optimization solutions using sensitivity analysis.

## Prerequisite(s): None

## Text Book:

- Arora, J.S., *Introduction to Optimum Design*, Second Edition, Elsevier, 2004.
- Venkataraman, P. (2002). *Applied optimization with MATLAB programming*. New York, Wiley.

## References:

- Ravindran A., Ragsdell K.M. , Reklaitis G. V., 2006; *Engineering Optimization Methods and Applications Second Edition*
- Kirsh, U., 1981; *Optimum Structural Design, Concepts, Methods and Applications. Mc Graw Hill Book Company.*

## Course Website:

Students are required to enrolled to **CE551** on **TEAMS**. All announcements and course material will be posted on TEAMS.

## Grading:

The final grades will be computed according to the following scheme:

<u>Assessment</u>	<u>Weight</u>
Homework	20%
Project (Midterm)	30%
Paper Review	10%
Final Project	40%