1. Course Description
In online computation an algorithm receives and processes the input in partial amounts. In a typical setting, an online algorithm receives a sequence of requests for service. It must service each request before it receives the next one. In servicing each request, the algorithm has a choice of several alternatives, each with an associated cost. The alternative chosen at each step may influence the cost of alternatives on future requests. Such situations naturally arise in, for example, routing packets in networks, allocating resources in an operating system, and paging in a virtual memory system.

This special topics course gives an in-depth introduction to competitive analysis, a mathematical framework within which such problems can be analyzed and solved. In this framework, the quality of an algorithm is measured against the best possible performance of an algorithm that has complete knowledge of future inputs (offline algorithm).

Starting with the basic definitions of the competitive analysis model, we will study most of the essential techniques through various examples:

- The List Accessing Problem
- Paging in a Virtual Memory System
- Routing in a Communication System
- Metrical Task System
- k-Server Systems
- Load Balancing

We will also explore how competitive analysis relates to more classical subjects such as game theory and decision theory.

2. Prerequisites
Graduate Standing; COT5405 Design and Analysis of Algorithms

3. Objective
The objective of the proposed special topics course is (1) to train the students in the analysis and design of online algorithms (2) to show them that these tools and algorithms can be applied successfully in many real-life situations.

4. Evaluation
Grades will be based on homework assignments, class presentations, and a final project.

5. Books