

# The University Course Timetabling Problem

## Description

In this project, you will model and solve the university course timetabling problem via ASP. For course timetabling, one must assign course lectures to several time slots and rooms.

This assignment must satisfy some *hard constraints*. For instance, lectures of courses taught by the same instructor must be scheduled at different time slots (since the instructor cannot be in more than one room simultaneously).

In addition to hard constraints, there are some *soft constraints*. For instance, courses offered to the same cohort should have fewer gaps (time slots without lectures) between them. For each soft constraint violation, a penalty is applied. Then, in course timetabling, one aims to find a schedule with a minimum penalty.

In this project, you will represent and solve the university course timetabling problem for the courses offered by the METU Computer Engineering department in a semester (Fall/Spring). Please see the attached tables for related information like courses offered in a given semester, their instructors, the expected number of students enrolled in each class, lecture rooms of the department and their capacities.

## Specifications

- You need to represent the hard and soft constraints in ASP. Above, there are two examples, but you are expected to express such constraints
- In your ASP encoding, represent all the related hard and soft constraints of the problem. Above, you can find two examples of these constraints. For each constraint you represent, please write a comment that explains it clearly and succinctly. E.g.:

```
%  
% Lectures of courses the same instructor offers cannot be scheduled in the same time slot.  
%
```

- Divide your solution into an encoding and instance file. The encoding file will represent the course timetabling problem in general. The instance file(s) represents the specific problem instance, the Spring semester of METU CENG.
- You are expected to use the ASP solver clingo. Consider you name your encoding file as `timetabling.lp` and the instance file as `'fall-metu-ceng.lp'`, a typical command line to solve the problem is:

```
$ clingo timetabling.lp fall-metu-ceng.lp
```

- You are expected to process and represent the solution answer set (i.e. the resulting schedule) in an easy to understand form (e.g., in tables).
- We highly recommend you check out encoding problems in the Chapter 3 of the book 'Answer Set Programming', V.Lifschitz. Additionally, Chapter 6 gives information about aggregates like count, sum and optimization directives.