Project 4: Office Hours - The Logic

- Teacher opens office hours:
  - Has students on the chairs, help students
  - No students on the chairs, do own work
- Student arrives to ask for help:
  - If no other students (i.e., teacher does own work), call teacher and ask for help
  - If teacher is helping another, wait and sit on an available seat, until his/her turn
  - If no chairs available (of course, teacher is helping other students), the student will leave and come back later.
- Teacher, Students, and Chairs
- When the blocking and unblocking happen?

The logical flow of teacher
The logical flow of students
The role of the chairs

Teacher helps students FIFO.
Or, the chairs are taken FCFS.

Project 4: Office Hours – some programming requirements

- Inputs: N students, M chairs, the sleep time interval [left, right]
- Random sleeps are needed for
  - Students study for a random time
  - Teacher helps a student for a random time
  - A thread sleeps for a second or so after being created
- Use a short sleep: mytime(), control sleep time; (mytime.c, mytime.h)

```
int mytime (int left, int right)
{
        int time = 0;
        time = left + rand()%(right - left);
        // printf("random time is %d sec\n", time);
        return time;
}
```

Project 4: Office Hours - some programming requirements

- **How to start multiple threads of the same type, and with sleep:**
  - Sample code: PC-inputs-main-mytime.c
- **Build your project and test in steps:**

1) Try to run the sample; modify it to implement the creation and termination of the students threads and teacher thread,

2) Add variables and operation functions, add mutex

3) Add semaphores for blocking and unblocking, add student thread sleep properly.

4) Add all the needed printfs! (check the requirements)

5) Test done code with 1 student, n (<m) students, and n(>m) students. Check the correctness by observer the printouts.

- **Compiling multiple source code:**
  - your project code (say, p4-x.c), mytime.c, mytime.h
  - Use makefile,
  - Note: add "-Wall -std=c99" to gcc lines

```
P4-x:  p4-x.o mytime.o
   gcc -lpthread -o P4-x P4-x.o mytime.o

P4-x.o: P4-x.c mytime.h
            gcc -c P4-x.c –lpthread

mytime.o: mytime.c
            gcc -c mytime.c
```

Project 4: Office Hours – A Short Report

- Evaluation your project in a short report
  - Check the word count requirement. Will be less than one page.
  - Suggested format: Font size 11, Times New Roman, single space. 1” margin
- Evaluation by answering questions:
  - About the occurrence of deadlock
  - About the occurrence of starvation (fairness)
  - Compare the two implementations in their use of semaphores, or conditional variable.