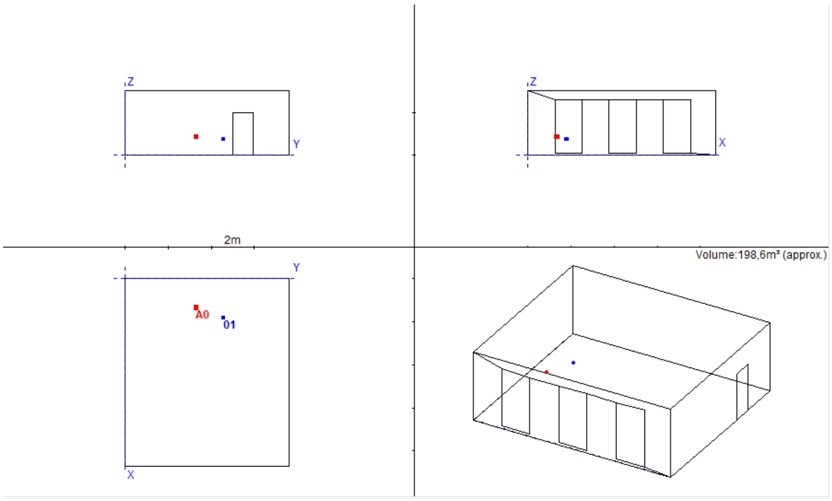
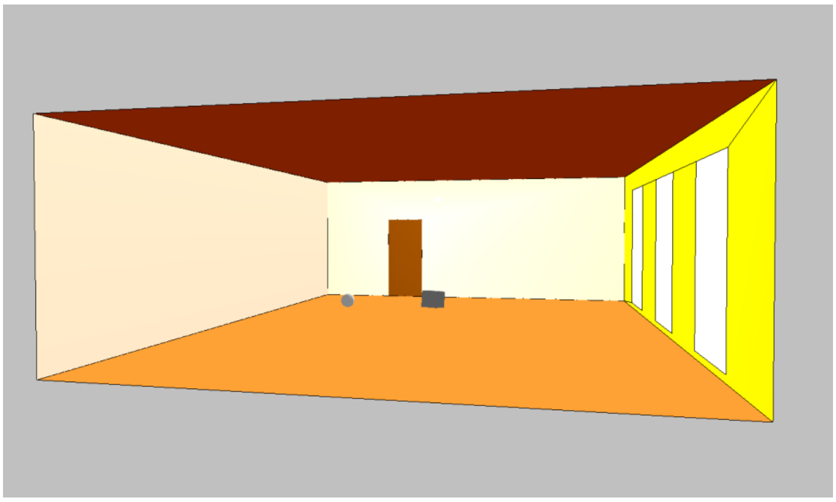
EXERCISE 1

CASE A

An empty classroom (classroom 1) is defined as in the following figures:





1) In octave bands, assign a low absorption coefficient to each surface of the classroom, according to the values plotted in the table given in the lessons' slides:

-the floor s1

-the ceiling s2

-the rear partition composed by the wall s3 and the door S4

-the internal walls S5 = $(S5_1+S5_2)$

-the facade partition composed by the wall S6 and the windows S7

2) Evaluate the area of every surface considering:

Window surface: 3.15 m^2

Door surface: 1.8 m^2

Height: 3 m

Length: 8.5 m

Width: 7.3 m

3) evaluate the average apparent absorption coefficient of the classroom

3) evaluate the Room Constant

5) evaluate the equivalent sound absorption area

6)evaluate the Reverberation Time using both Sabine end Eyring formula in octave bands

7) evaluate the deviation $(T_{Sab}-T_{Ey})/T_{Sab}$ in octave bands

CASE B

Repeat the procedure from point 1 to pint 7 for other two classrooms. The dimensions follow:

<u>Classroom n°2:</u>

Window surface (each one): 2 m^2

Door surface: 1.8 m^2

Height: 2.4 m

Length: 6.8 m

Width: 5.8 m

<u>Classroom n°3:</u>

Window surface (each one): 3.78 m^2

Door surface: 1.8 m^2

Height: 3.6 m

Length: 10.2 m

Width: 8.7 m

CASE C

Repeat case A and case B substituting the window's absorption coefficient with that one for heavy absorption curtains and subdividing the floor surface S1 in two parts. The 40% S1 remains as defined for case A and B, to the other 60% the audience absorption coefficient ha to be assigned.

EXECISE 2

For all the cases of the previous exercise calculate:

- the characteristic dimension $(V)^{1/3}$
- the frequencies for wchih the 3 rooms can be considered small rooms
- the frequency of Schroder using both the TSabine and TEyring values found out in the previous exercise.
- The axial modes (1,0,0), (0,1,0), (0,0,1) (2,0,0), (0,2,0), (0,0,2) (3,0,0), (0,3,0), (0,0,3)
- The tangential modes (1,1,0), (0,1,1), (1,0,1) (2,1,0), (1,2,0), (0,1,2) (2,2,0), (0,2,2), (2,0,2)
- The oblique modes (1,1,1), (2,1,1), (1,2,1) (2,1,2), (1,2,2), (2,1,2) (2,2,2), (3,2,2), (2,3,2)

Considering:

For $n = (n_x, n_y, n_z)$ and

$$f_n = \frac{c}{2}\sqrt{(n_x/L_x)^2 + \left(n_y/L_x\right)^2 + (n_z/L_x)^2}$$