HVAC 1

1. **Course number and name:** 020CL1ES3 HVAC 1

2. **Credits and contact hours:** 4 ECTS credits, 2x1:15 contact hours per week

3. **Name(s) of instructor(s) or course coordinator(s):** Said Chehab

4. **Instructional Materials:** Professor text book and other supplemental materials

5. **Specific course information**
   a. **Catalog description:**
   Thermal Comfort: Thermal and Hydrothermal Exchange - Interior Basic Conditions - Exterior Basic Conditions - Comfort Elements: Activity, Clothes, Hygrometry, Radiation, Temperatures - Psychometric Chart: Calculation and dimensioning of heating, Cooling, Humidifying, Dehumidifying systems for interior ambient - Load Estimation for Heating taking in account the Impacts of Ventilation, Wall insulation, Glazing treatment, Lighting and Equipment heating production, etc. - Central Heating using Hot Water: Presentation, Design and sizing of radiators, Fan-coils, Floor heating, Convectors, Pipes, Pumps, Boilers, Burners, Domestic hot water, Fuel tanks, Chimney, etc. - Heating with Hot Air: Production of hot air, Air handling unit, Fan coil unit - Presentation, Design and sizing using the psychometric chart of heating coils, Humidifiers, Air filters, Fans, Mixing box.

   b. **Prerequisites:** Fluid Mechanics (020MEFES1) or Fluid Mechanics 1 (020MF1ES1), Thermodynamics 2 (020TH2CI4) or Introduction to Heat Transfer (020ITCNI3).

   c. **Required** for ME students, **Selected Elective** for EE students.

6. **Educational objectives for the course**
   a. **Specific outcomes of instruction:**
   A student who successfully fulfills the course requirements will have demonstrated an ability to:
   - Introduce students to common HVAC systems.
   - Understand the methods used to control the thermal environment.
   - Identify and evaluate the various sources of heat loss and gain for a space.
   - Use weather data to calculate basic cooling and heating loads on a building using both computer packages and hand calculations.
   - Determine which heating and air conditioning systems are necessary for a building when given data on building construction and heating and cooling loads.
   - Understand the procedures used in designing air-distribution systems, duct layout, and duct sizing.

b. PIs addressed by the course:

PI	1.1	1.2	1.3	7.1
Covered	x	x	x	x
Assessed	x	x	x	x

7. Brief list of topics to be covered

- Introduction and Historical Background. (1 lecture)
- Psychrometry and Psychrometric Processes. (4 lectures)
- Human Thermal Comfort and Indoor Air Quality. (6 lectures)
- Heating and Cooling Load Calculations in Buildings. (6 lectures)
- Hot Air Diffusion. (5 lectures)
- Central Heating System. (6 lectures)