Course Title	Heating Coolinng and Air Conditioning				
Course Code	ME408				
Course Type	Compulsory				
Level	BSc (Level 1)				
Year / Semester	4th Year / 7th Semester				
Teacher's Name	Dr. George Karagiorgis				
ECTS	6	Lectures / week	3	Laboratories/week	1
Course Purpose	The course purpose is to provide students with the necessary fundamental knowledge in the field of Heating Cooling and Air Conditioning, introduce them to the design of efficient air-conditioning systems, performing heating cooling load estimates, and calculate all the parameters associated with the refrigeration cycles Upon completion of this course, the students will be able to develop skills on analysing HVAC systems, perform systems design, analysed new refrigeration cycles etc. The combination of theoretical knowledge and practical applications will enable students to comprehend better the whole concept.				
Learning Outcomes	**By the end of the course, students must be able to:** 1. Perform heating load estimate. 2. Perform cooling load estimate. 3. Make calculations related to psychrometry. 4. Understand the refrigeration cycle and make calculations. 5. Make a preliminary design to match comfortable conditions of a building.				
Prerequisites	**ME200, ME202**	Corequisites	**None**		
Course Content	• **Air-Conditioning Loads:** Calculate the heating load for a buildings (ASHRAE), describe, Understand heat transfer processes. And make calculations of the overall heat transfer coefficients (U values) for external walls, fenestration, windows, doors, roofs, floor etc. The students will learn how to calculate heat gain or loss from infiltration, how to perform Cooling load transient analysis (hourly), and estimate heat entering the space either from conduction convection radiation. • **Solar Radiation / Psychrometry:** The concepts of solar heat gain and solar load Will be defined and see how they can be estimated for various conditions. Introduction to important terms , definitions and principles used in the study of systems consisting of dry air and water and learn how to compute psychrometric properties. Understand how a variation in humidity				

	will affect the comfortable conditions and how to use the properties of atmospheric air to provide a controlled atmosphere in buildings. Calculate relative / specific humidity, partial pressures of vapour and dry air, dew point, density of mixture etc. • **Comfort and Health:** Use correct range of temperatures to meet the comfortable conditions and maximise energy savings, define thermal comfort, thermal comfort parameters, clothing level, and metabolic rate. The students will be familiar and use all the above when calculating heating and cooling load for a building and select proper and efficient design conditions. • **Complete Air - Conditioning systems:** Describe some of the common types of refrigeration and heat pumps systems presently in use and to illustrate how such systems can be modelled thermodynamically. Students will learn how to classify Air conditioning systems. (All air systems, Terminal Units, All water systems, Package unit systems) and select the most applicable AC system for the given application. They should be able to design Air – Conditioning systems based on Direct Expansion systems and All Water fan coil units.
Teaching Methodology	The course is delivered to the students by means of lectures, conducted with the help of computer presentations. Lecture notes and presentations are available through the e-learning platform for students to use in combination with the textbooks. Furthermore theoretical principles are explained by means of demonstration examples and solution of specific problems. Lectures are supplemented with laboratory work carried out with the supervision of a lab assistant.
Bibliography	1. Heating and Cooling of Buildings: design for efficiency, by Kreider, Jan F, Curtiss, Peter S, Mc Graw-Hill 2010. 2. Faye C. McQuiston, Jeffrey D. Spitler, Jerald D. Parker, “Heating, Ventilating, and Air Conditioning: Analysis and Design”, Fifth Edition, John Wiley & Sons, 2000. 3. Andrew Parr, “Air Conditioning Principles and Systems: An Energy Approach”, Fourth edition Edward G. Pita Prentice Hall, 2001. 4. 2011 ASHRAE Handbook Heating Ventilating and Air-Conditioning applications. 5. Modern Refrigeration and Air conditioning - study guide by Althouse Andrrew B; Turnquist Carl published by Goodheart (Illinois), 2004 isbn:1590702816.
Assessment	• Assignments 10% • Laboratories 10% • Tests 20% • Final Exam 60%
Language	English