TOPIC 5	**Overview of 2D and 3D Coordinate Systems**
SUB-TOPICS	▪ Euclidean Spaces ▪ 2D Cartesian Coordinates ▪ Rotation of Axes in 2D ▪ 2D Polar Coordinates, Cartesian ↔ polar conversion ▪ 3D Cartesian Coordinates, examples of surfaces ▪ (3D) Cylindrical Coordinates, Cartesian ↔ cylindrical conversion ▪ (3D) Spherical Coordinates, Cartesian ↔ spherical conversion ▪ MATLAB example scripts: 2D rotation, 2D deformation, plotting polar coordinates, plotting 3D curves and surfaces, parametric plots
OBJECTIVES	by the end of this unit, students should: - be familiar with commonly used coordinate systems - recognise the polar and Cartesian equations of important curves and surfaces (lines, planes, conic sections and quadric surfaces) - be able to understand the relationship between Cartesian and polar/cylindrical/spherical coordinates - describe 2D rotation mathematically and also in MATLAB code - know how to use the polar, meshgrid, mesh, surf, contour3 functions in MATLAB - be able to customise 3D surface plots
KEY WORDS AND EXPRESSIONS	on MOLE
CORE STUDY MATERIALS	- Textbook selection - MATLAB Topic 5 Notes (the notes include all problems for this topic) - Vocabulary Lists
TEXTBOOK STUDY	**Essential Reading** Chapter 9 - Section 9.1 (Basic 2D Graphics) - Section 9.2 (3D-Plots) - Section 9.4 (Editing Plots) - Section 9.6 (Color) - Section 9.8 (Saving and Printing) - Summary **Recommended Reading** - the rest of Chapter 9, especially Section 9.3 (Handle Graphics) - handouts on polar coordinates, quadric surfaces
ADDITIONAL RESOURCES	handouts and links on MOLE and in the Topic 5 Notes