Thesis Title	**Investigation of the Performance of Hydraulic Systems for Lifting and Excavating Purposes**
Programme of Studies	BSc in Mechanical Engineering, Frederick University
Course	ME 400 Senior Project
Area of Study	Hydraulic and Pneumatic Systems
Student's Name	Evaggelos Stylianou
Students Reg. Number	20381
Supervisor	Dr.-Ing. Paris A. Fokaides, Professor, Mechanical Engineering Department
Co-supervisor	Mr Christos Kythreotis, Sustainable Energy Research Group
Supervisory Committee	Dr Andreas Poullikkas, Professor, Mechanical Engineering Department Dr. Michalis Menicou, Ass. Professor, Mechanical Engineering Department
Semester	Spring Semester 2025
Short Description	This thesis investigates the performance of hydraulic systems used in lifting and excavation applications, with emphasis on flow rate control, cylinder behavior, and system configuration. Through laboratory-based experiments, hydraulic circuits with cylinders in series and parallel were analyzed under varying load conditions. Measurements of pressure, flow rate, and actuator speed were used to evaluate system efficiency, synchronization, and operational limitations. The study highlights the influence of flow rate on actuator velocity, the challenges of load balancing in parallel circuits, and the sensitivity of series circuits to flow demand. The findings provide practical insights for optimizing hydraulic system design in construction machinery.