

Master Thesis Brief Description

Thesis Title	Operational Energy Assessment of Buildings Using the Frederick Digital Twin Model
Programme of Studies	MSc in Energy Engineering
Course	MEE 540 - MSc Thesis
Area of Study	Computational Building Physics – Smart Buildings
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Supervisory Committee	Dr Byron Ioannou, Professor, Architectural Department Dr. Gregoris Kalnis, Asst. Professor, Architectural Department
Semester	Fall Semester 2025
Short Description	This thesis explores the application of digital twin technology for real-time operational energy assessment of buildings. Using Frederick University as a case study, the digital twin integrates live data from HVAC systems, occupancy patterns, and weather conditions to monitor and simulate building energy performance. Key performance indicators such as energy use intensity and system efficiency are evaluated. The study demonstrates that digital twins provide more accurate, adaptive, and actionable insights than conventional static models, supporting data-driven energy management and alignment with EU energy efficiency objectives.