ΠΑΡΟΥΣΙΑΣΗ ΔΙΠΛΩΜΑΤΙΚΗΣ ΕΡΓΑΣΙΑΣ

Της φοιτήτριας Ουρανίας Χαμαλάκη, θα γίνει τη

<u>Δευτέρα 14/11/2022</u> και ώρα **11:00**

στην αίθουσα Τηλεκπαίδευσης Ε130 του Κτιρίου Μαθηματικών και Εφαρμοσμένων Μαθηματικών

Διμελής επιτροπή: κα. Βαμβακάκη Μαρία (επιβλέπουσα) και

κα. Χατζηνικολαΐδου Μαρία

Θέμα Διπλωματικής:

«*Synthesis of biodegradable polymers for 3D printed scaffolds for bone tissue engineering*»

Abstract:

Poly(lactic acid) (PLA), poly(glycolic acid) (PGA) and their copolymer poly(lactic-*co*-glycolic acid) (PLGA) are widely used polymers in biomedical research and bone tissue engineering, as they are well-known eco-friendly biodegradable and bio-based polyesters, with good mechanical properties. These polymers are primarily obtained by the bulk batch polymerization of the monomers at high temperatures using a tin-based catalyst. Because of transesterification, this approach produces unusually large polydispersity index (PDIs) polymers, while the tin-based catalyst, which is toxic to the body, is difficult to remove from the product. With the rising use of PLA and PLGA in the biomedical industry, metal-free organic catalysts are essential. In this thesis, an efficient and convenient organocatalyst for the ring-opening polymerization of cyclic esters, was used in the synthesis of poly(lactic acid), poly(glycolic acid) and their random copolymer poly(lactic-*co*-glycolic acid) at different temperatures, reaction times and monomer ratios. The materials were characterized by ^{1}H NMR spectroscopy and size exclusion chromatography and their thermal properties were investigated by thermogravimetric analysis and differential scanning calorimetry. The optimal reaction conditions were then employed in an upscaled polymerization to produce polymers that can be processed into filaments by extrusion for the fabrication of 3D printed scaffolds via an easily accessible and low-cost printing method, known as Fused Deposition Modeling (FDM).