ME 495 - 261 Proposal Submission

Ser.#	Advisor Name	email	Research Title	Research Description	Area of research
1	Usman Ali	usman.ali@kfupm.edu.sa	3d printed parts and their applications	Use of 3d printed components and their analysis, characterization and testing	mechanical engineering
2	Mohammed Al-Solihat	mohammed.alsolihat@kfupm.edu.sa	Vibration Energy Harvester for Human Motion	A vibration energy harvester for human motion is designed to convert mechanical vibrations from activities such as walking or running into electrical energy. The device usually consists of a mass-spring system and an energy conversion mechanism. It is optimized for low-frequency human motion and compact size. The generated energy can be stored and used to power small electronic devices.	vibration energy harvesting
3	Fida Hassan	sfhassan@kfupm.edu.sa	Hydrogen Storage Metal/composite	This research investigates advanced metal and composite materials for efficient hydrogen storage. The study focuses on improving hydrogen absorption capacity, storage stability, and release kinetics through alloy design and microstructural control, contributing to clean energy technologies and sustainable hydrogen-based energy systems.	Materials & Manufacturing
4	Fida Hassan	sfhassan@kfupm.edu.sa	Biodegradable Alloy	This project explores the development of biodegradable metal alloys for biomedical applications. The research examines corrosion behavior, mechanical strength, and biocompatibility to design materials that safely degrade in the body while maintaining structural	Materials & Manufacturing
5	Fida Hassan	sfhassan@kfupm.edu.sa	Degradable Fracking Alloy	This research focuses on developing degradable metal alloys for temporary downhole applications in hydraulic fracturing. The study aims to optimize mechanical performance and controlled dissolution behavior, enabling efficient resource extraction while reducing long-term	Materials & Manufacturing
6	Fida Hassan	sfhassan@kfupm.edu.sa	High Strength Heterogeneous Metal-Metal nanocomposite	This project investigates high-strength metal–metal nanocomposites with heterogeneous microstructures. By engineering nanoscale phase distribution and interface strengthening mechanisms, the research seeks to enhance strength, ductility, and structural stability for advanced engineering applications.	Materials & Manufacturing
7	Fida Hassan	sfhassan@kfupm.edu.sa	Light-weight High Entropy Alloy	This research examines lightweight high-entropy alloys designed for high strength-to-weight performance. The study focuses on alloy design, phase stability, and mechanical properties, aiming to develop advanced materials suitable for aerospace, automotive, and energy	Materials & Manufacturing
8	Hussain Alqahtani	qahtanih@kfupm.edu.sa	Physics-Informed Neural Networks (PINNs) for Solving Engineering Mechanics Problems	This research explores the application of Physics-Informed Neural Networks (PINNs) as a mesh-free framework for solving forward and inverse problems governed by partial differential equations in engineering mechanics. The student will implement PINNs to model representative problems such as wave propagation, heat transfer, or structural vibration, embedding the governing equations and boundary conditions directly into the loss function. The work will involve benchmarking PINN predictions against classical analytical and numerical solutions, studying the effect of network architecture and training strategies on accuracy and convergence, and identifying the strengths and limitations of PINNs compared to traditional solvers.	Computational Mechanics / Machine Learning
9	Yassmin Seid Ahmed	yassmin.seidahmed@kfupm.edu.sa	AI-Driven Circular Manufacturing of Polymer Materials: Recycling and Upcycling Polymers into High-Value Additively Manufactured	1. Evaluation of Material Recyclability across Recycle Cycles Determine whether repeated recycling affects important material attributes, such as thermal stability (Tg, Tm), melt flow performance, structural integrity, and functional properties, for successfully recycled PET, PE, PP, and ABS polymers from industries utilizing the Recycling Programs in KSA. 2. Evaluation of the Suitability of Recycled Polymers for 3D Printing and Upcycling Understand if there are ways to evaluate the capabilities of using recycled polymers for FDM Printing, as well as the suitability of recycled polymers for dimensional stability. Investigate how the quality of printed parts varies with changes in process parameters. 3. Creation of Machine Learning Predictive Models Utilize machine learning to correlate the type of polymer, recycle cycle, and print parameters to the value and qualities of the end product. 4. Creation of a Data-Driven Upcycling Methodology Develop a unified framework and methodology that enables Saudi industries to process recyclables into high-value R&D components for additive manufacturing, grounded in Experimental Results and AI Models. 5. Evaluation of the Effect of Recycled Materials and Their Industrial Applications Quantify how recycled PET, PE, PP, and ABS materials and components can replace virgin materials to satisfy industry demand for various applications, including Packaging, Automotive Parts, Industrial Tooling, and Consumer Goods.	Materials & Manufacturing
10	Aamer Nazir	aamer.nazir@kfupm.edu.sa	Design for Additive Manufacturing and Mechanical Metamaterials	Student must use Solidworks, ANSYS or equivalent software for design.	Advanced Materials and Additive Manufacturing
11	Abdullah Al-Sharafi	alsharafi@kfupm.edu.sa	Hybrid Optimization of Multiple Renewable Energy Resources in KSA	Optimization of RE (Solar/Wind/others) syetsmes for elctricity/H2 produation	Renewable Energy