

# **A Greedy Heuristic for Scheduling Hybrid Medical School Courses with Metaverse Integration**

**Seckin Damar**

Department of Industrial Engineering,  
Faculty of Management, Istanbul Technical University  
Istanbul, Turkey  
damar17@itu.edu.tr

**Gulsah Hancerliogullari Koksalmis**

Department of Industrial Engineering and Management Systems  
University of Central Florida, Orlando, FL, USA  
ghancerliogullari@ucf.edu  
Department of Industrial Engineering, Faculty of Management,  
Istanbul Technical University, Istanbul, Turkey  
ghancerliogullari@itu.edu.tr

## **Abstract**

University course scheduling is a complex NP-hard optimization problem that becomes even more challenging when incorporating modern instructional formats such as metaverse-based education. This study proposes a tailored greedy algorithm to address hybrid course scheduling, involving both traditional and metaverse courses. The model incorporates a comprehensive set of constraints reflecting real-world scheduling challenges, such as room capacities, time availability, and the eligibility of professors and rooms—particularly for metaverse settings, where specialized hardware, digital platforms, and instructional preparedness must be considered. A binary integer programming formulation defines decision variables, constraints, and an objective function that maximizes the weighted alignment of professors with metaverse courses. Synthetic datasets of varying sizes were generated to test the algorithm's performance. The results demonstrate the algorithm's efficiency in producing feasible timetables that align with institutional constraints and instructional goals. The greedy algorithm provides a robust and scalable initial solution for use in metaheuristic optimization frameworks. Its design promotes adaptive scheduling strategies that can accommodate technological advances in higher education while preserving feasibility and instructional quality.

## **Keywords**

Course Scheduling, Greedy Algorithm, Metaverse Education, Integer Programming, Optimization

## **Biographies**

**Dr. Gulsah Hancerliogullari Koksalmis** holds a BSc and MSc in Industrial Engineering from Bilkent University and earned her PhD in Engineering Management and Systems Engineering from Old Dominion University, USA. Her research focuses on technology management, operations management, medical decision making, healthcare digital twins.

**Seçkin Damar**, MSc, is currently pursuing a PhD in the Department of Industrial Engineering at Istanbul Technical University. She completed her BSc in Industrial Engineering at Yildiz Technical University and obtained her MSc in

the same field from Istanbul Technical University. Her research interests include technology management and its applications in operations research.