

# Menu Engineering for Assisted Living Facilities

**28 July 2023 (Fri) | 2:00 - 3:00 pm**  
**YEUNG-P7303**

## Abstract

We design healthy menus for assisted living facilities under multiple, often conflicting, objectives and complex nutritional constraints. The proposed system considers various factors in the construction of menus, including the United States Department of Agriculture (USDA) healthy eating guidelines (HEG), chefs' choices and experiences, diversity of menu items, cost, and residents' preferences with different dietary requirements/diet patterns. A modeling framework was developed based on the input collected by interviewing facility managers, chefs, and dietitians. We address this complex multi-objective optimization problem using Mixed Integer Linear Programming (MILP). We propose a pseudo diet type concept using clustering and principal component analysis to represent multiple distinct eating patterns in the same diet type. The modeling framework utilizes various approaches to incorporate different stakeholders' perspectives in the decision processes, including a satisficing approach to represent the menu diversification goals of chefs and goal programming to prioritize nutritionists' points of view while ensuring the autonomy of patrons. The efficacy of the proposed approach is demonstrated using two use cases of a setting containing over 300 menu items and three diet profiles. The final menus are evaluated based on the following performance metrics: total preference score, deviations from the HEG, and total cost.

## About the Speaker

Sadan Kulturel-Konak is a Professor of Management Information Systems and the Director of the Flemming Creativity, Entrepreneurship and Economic Development (CEED) Center at Penn State Berks. Dr. Kulturel also has an affiliated and graduate faculty appointment at Penn State Harold and Inge Marcus Department of Industrial and Manufacturing Engineering. Her research focuses on modeling and optimizing complex systems using hybrid approaches combining heuristic methods and exact techniques from probability and operations research. The primary application areas of her research include designing and redesigning facilities to provide significant economic benefits for industries.

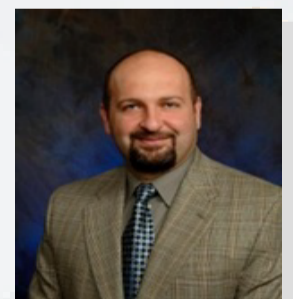


### **Professor Sadan Kulturel-Konak**

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## About the Speaker

Abdullah Konak is a Distinguished Professor of Information Sciences and Technology at the Pennsylvania State University, Berks. Dr. Konak also teaches graduate courses in the Master of Science in Cybersecurity Analytics and Operations program at the College of Information Sciences and Technology, Penn State World Campus. Dr. Konak's primary research focuses on modeling, analyzing, and optimizing complex systems using computational intelligence combined with probability, statistics, data sciences, and operations research. Dr. Konak published numerous academic papers on a broad range of topics, including network design, system reliability, sustainability, cybersecurity, facilities design, green logistics, production management, and predictive analytics.



### **Distinguished Professor Abdullah Konak**

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