

Problem solving in modern manufacturing systems using computational intelligence and other IT techniques. The students are introduced to advanced IT tools, such as: expert systems, artificial neural networks, evolutionary algorithms and fuzzy logic. Practical problem solving is emphasized through assigned coursework based on software development and use rather than in theoretical foundations of relevant tools and techniques. Standard topics dealt with are: Process Plan development. Definition and recognition of morphological features connected to particular manufacturing process types (material removal, sheet forming). Process parameter selection. Path planning, tool selection and feed scheduling in high speed milling. Machining time and surface quality criteria in machining operations. Manufacturing process control using quantitative and qualitative models. Transition from process parameter selection to process control. Manufacturing cell control: operation dispatching criteria (lead time, resource utilization etc.) Links to discrete event simulation. Manufacturing system design. Simplified process plans. Virtual Manufacturing Systems and case-based structure optimization. Manufacturing system diagnostics. Sensor based individual manufacturing process monitoring. Discrete state change monitoring in manufacturing systems. To attend this course, sufficient knowledge of the material of the following courses is strongly recommended: Manufacturing Systems.