NEW COURSE

Laser-Based Manufacturing

September 4 - December 11, 2025
(One-and-a-half-hour sessions once a week)

Online

This course counts toward the Manufacturing Excellence Certificate. Registered participants earn a **10% discount**. **Learn more: go.wisc.edu/MECert2025**

This course offers a deep dive into laser fundamentals, optics, and motion control, paired with hands-on insights from decades of industry and research experience. Participants will explore laser-material interactions, laser processes, laser system design and setup, and real world problem solving techniques through interactive sessions and weekly applied learning. Whether you're new to laser manufacturing or looking to improve your skills, this course prepares you to make informed decisions and drive improvement while becoming a more valuable team member.

go.wisc.edu/LaserBasedManufacturing

College of Engineering
UNIVERSITY OF WISCONSIN–MADISON

COURSE OUTLINE

- **Brief history of lasers and laser safety**
- **How different lasers work**
- **How laser beams propagate and how to control the propagation**
- **How different lasers interact with different materials - metals and non-metals**
- **How different laser processes work**
  - **– welding**
  - **– cutting**
  - **– heat treating**
  - **– polishing**
  - **– structuring**
  - **– and others**
- **How to troubleshoot laser processes and systems with real world examples**

INSTRUCTORS

Dr. Frank Pfefferkorn is a Professor of Mechanical Engineering at the University of Wisconsin–Madison. His teaching and research are focused on discrete metal part manufacturing processes, and heat transfer as it applies to manufacturing processes. His goals are to: (1) educate/develop manufacturing engineers/workforce, and (2) build a scientific understanding of advanced manufacturing processes, develop physics-based models that can be used to improve and control these processes, and to transfer this fundamental knowledge to industry. In addition to being a Professor in the Department of Mechanical Engineering, he serves as the Academic Director of the online MS Manufacturing Systems Engineering Program at UW–Madison.

Kevin Klingbeil is a seasoned expert in laser systems and manufacturing processes with over 25 years of experience in development and design with technology leadership of multidisciplinary teams. His expertise spans laser welding, cutting, scoring, cladding, and heat treating across both metallic and non-metallic materials using a wide range of laser systems and wavelengths. Currently, he leads his own consulting firm, Cross Product Solutions, helping manufacturers optimize laser processes and system integration.

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