# ENGM 528 Engineering and Sustainable Development

## Course Description

This course explores the intersection of engineering and sustainable development, focusing on how engineering practices can contribute to achieving sustainability goals. Students will gain a holistic understanding of sustainability principles and their applications in engineering contexts. Key topics include sustainability in design, life cycle assessment (LCA), green engineering practices, and the development of sustainable solutions that balance environmental, economic, and societal factors.

## Course Learning Outcomes

By the end of the course, students will be able to:

1. Demonstrate critical knowledge and understanding of the principles of sustainable development and how they relate to engineering.
2. Apply life cycle assessment (LCA) to evaluate the environmental impacts associated with engineering products and processes.
3. Design sustainable engineering solutions by integrating green engineering principles, material selection, and energy efficiency.
4. Critically analyze engineering systems through the lens of sustainability, using tools such as LCA and sustainability metrics.
5. Communicate complex sustainable concepts effectively in written and oral formats.
6. Assess the ethical and professional responsibilities of engineers in promoting sustainable development, considering the global implications of engineering decisions for future generations.
7. Work professionally, taking significant responsibility for both individual and group tasks in addressing sustainable engineering solutions in real-world contexts.

## Learning Resources

Sustainable Engineering: Drivers, Metrics, Tools, and Applications By Krishna R. Reddy, Claudio Cameselle, Jeffrey A. Adams ISBN: 978-1-119-49393-8, June 2019, 544 pages

## Course Content

1. Introduction to Sustainability and Engineering
2. Sustainability Principles and Frameworks
3. Life Cycle Assessment (LCA)
4. Green Engineering Principles
5. Sustainable Design and Innovation
6. Energy and Resource Efficiency
7. Water and Waste Management
8. Sustainable Materials and Manufacturing
9. Ethics and Social Responsibility in Sustainable Engineering