PRGR 647
Sustainable Building Design and Construction (2 credit)

Catalog Description:
Implementation of sustainability principles throughout the building's lifecycle: building rating systems (LEED, BREEAM, ESTIDAMA etc.), embodied energy, carbon content, and emission of COx, SOx, and NOx of building materials, elements, and construction process. Energy efficiency, water and wastewater management, indoor environmental quality, materials, and location/transportation measures.

Textbook:
- Kubba, S. "Handbook of Green Building Design and Construction," First Edition, Butterworth-Heinemann, 2012.

- Diven, Richard, and Shaurette, Mark. "Demolition: Practices, Technology, and Management," Purdue University Press, 2010, ISBN: 978-1-55753-567-2.

References:
- Kibert, C. J. "Sustainable Construction: Green Building Design and Delivery," Second Edition, New York: John Wiley & Sons, Inc., 2008.

- McDonough, W. and Braungart, M. "Cradle to Cradle: Remaking the Way We Make Things," New York: Farrar, Straus and Giroux, 2002.

Coordinator:
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Prerequisite by Topic:
No pre-requisite courses are required. However, having prior experience with design or construction is preferred.

Educational Objectives/ Learning Outcomes:
Students that successfully complete this course will:
- Describe the concepts of sustainability, carbon footprint, green building design and construction process, and high-performance buildings.
    - Method of assessment: Reporting on the concepts of sustainability in the context of a building that the student knows well.
    - Assessment criteria: The report will be in a discussion forum. The student will be able to explain how the social, economic, and environmental aspects of sustainability are included as part of the building design and construction.
- Evaluate when and how to use the appropriate green building rating systems.
    - Method of assessment: A short presentation explaining how a project was able to achieve the rating in a selected area in the LEED green building rating system.

    - Assessment criteria: The presentation will be in Powerpoint or Prezi and will include up to 15 slides. The student will be able to discuss the level of ease or difficulty in earning each of the credits.
- Accumulate the necessary knowledge to sit-in for the LEED GA exam.
    - Method of assessment: A quiz with questions taken from the USGBC LEED Green Associate exam.
    - Assessment criteria: Be able to answer more than 80% of the multiple-choice questions correctly.
- Apply resources, tools and references on green building projects.
    - Method of assessment: A feasibility study of implementing green concepts to make a building more sustainable.
    - Assessment criteria: Thorough assessment of cost, benefit, and level of ease or difficulty with implementing green concepts.

Topics Covered:

Introduction: Rationale for High-Performance Green Buildings (Kubba Ch. 1, Kibert Ch. 1&2)
Relationship Between Development and Environment Sustainability and Ethics
Green Building Basic Concepts, Terminology
Evaluation Systems and Rating Standards (Kubba Ch. 2) LEED Certification Process
Transportation and Location (LEED v4)
Green Building Components: Sustainable Sites (Kibert Ch. 6)
Green Building Components: Materials and Resources (Kubba Ch. 6, Ch. 10 Diven & Shaurette)
Green Building Components: Indoor Environmental Quality (Kubba Ch. 7)
Green Building Components: Water Efficiency (Kubba Ch. 8)
Green Building Components: Energy and Atmosphere (Kubba Ch. 9)
Green Building Commissioning: (Kubba Ch. 11)
Green Buildings and BIM
Green Building Economics and Cost Analysis (Kubba Ch. 10 & 12, Kibert Ch. 13)

No lab experiments are required.

Assessment and Grades:

- Class Activities (75%)
- Term Exam (25%)

Computer Usage