Teaching Commercial Building Energy Efficiency with Course Content from ENERGY STAR®:

Introduction to Commercial Building Energy Efficiency through EPA's ENERGY STAR Program

Caterina P. Hatcher
ENERGY STAR National Manager, Public Sector
U.S. Environmental Protection Agency

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Learn more at energystar.gov

Overview of Development and Availability

- College-level course gives students practical, hands-on experience with commercial building energy efficiency
- Developed in partnership with the Omaha Public Power District (OPPD) and Metropolitan Community College of Omaha, NE
- Piloted in Spring 2010
- Available now at no cost to interested colleges, universities, schools, associations, and organizations

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Course Summary

- Gives students an edge in the rapidly expanding green workforce
- No-cost, off-the-shelf package from EPA that can be added to your course catalog
- Course can be customized and expanded to your needs
- Includes everything you need to bring commercial building energy efficiency to the classroom

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Resources Available

- Two-page Overview
- Short Description for Course Catalog
- Course Outline and Reading List
- Syllabus
- Student Project
- Course Lecture Plans and Presentation
- Additional Resources

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Course Overview

- Two-page overview of the course and available materials
- Use it to:
  - Introduce the course to administrators, students, and other instructors
  - Build support and demand for the course

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Course Outline and Reading List

- Provided to help you add the course as an offering
  - Tailor the course outline for your course approval process
  - Refer to the reading list and objectives and submit the course under the appropriate department
  - Use the course description for your school's course catalog

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Syllabus

- Tailor this template syllabus for your offering
  - Ready to hand out to students
- Includes:
  - Overall course learning objectives
  - Unit/weekly learning objectives
  - Description of student project
  - Suggested assessment methods and course structure
  - Reading list and review questions

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Course Lecture Plans and Presentations

- Lecture plans to help guide each unit
  - Includes suggested review questions and class structure for each week
- Weekly presentations
  - Ready-to-use presentations that can be tailored to meet your learning objectives
  - Includes in-depth, multi-media content

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Course Subject Matter

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Overview of Course Content

- Provided as an 11–16 week course
  - Weekly lecture content
  - Weekly review questions
  - Midterm and final presentation details
  - Student project
- Additional content includes:
  - New buildings
  - Green buildings
  - Building energy audits

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Student Project

- Gives students practical, hands-on experience with commercial building energy efficiency
- Students will:
  - Tour a building with a professional to learn how to identify energy efficiency opportunities
  - Benchmark the energy use of an actual commercial building in the community
  - Visit the building and conduct a walk-through examination
  - Identify potential energy efficiency opportunities
  - Write and present a report of their findings

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Week 1

- **How Does Eliminating Energy Waste through Energy Efficiency Fit into Sustainability, Green Building, Climate Change, Clean Air, and More?**
  - What is Climate Change?
  - Introduction to the EPA
  - Seven strategic priorities of EPA
  - The connection between energy efficiency and climate change
  - EPA endangerment findings

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Week 2

- **Transforming the US Economy to be More Energy Efficient – A Broad Look**
  - Discuss background of McKinsey report, *Unlocking Energy Efficiency in the U.S. Economy*
  - Review and discuss:
    - Scope of report
    - Size of energy efficiency opportunity
    - Challenges and solutions
    - Commercial sector findings and potential
    - Central conclusions

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Week 3

- **Market Transformation and the Role of the ENERGY STAR Program**
  - Building tour
  - ENERGY STAR program purpose
  - ENERGY STAR brand influence on consumer and organization decisions
  - ENERGY STAR Challenge
    - Portfolio Manager and the connection to stimulus funds
  - Increasing ENERGY STAR program effectiveness

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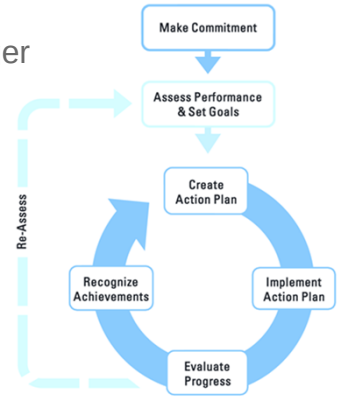
Week 4

- **Benchmarking Buildings and Prioritizing Improvements within a Portfolio of Buildings**
  - Overview of ENERGY STAR energy management tools
  - Benchmarking with Portfolio Manager
    - Live demonstration
    - Benchmark a sample building
  - Building Upgrade Manual
  - Getting started on your commercial project building



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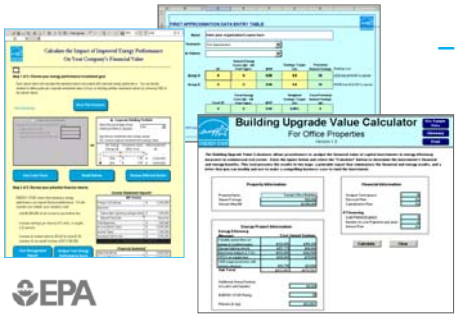
Week 5

- **Determining Financial Value and Funding Methods for Building Energy Efficiency Improvement**
  - Energy Services Performance Contracting
  - Emerging public finance models
    - Green bank, Clean Energy Victory Bonds, tax credit bonds, Federal loan guarantees, city funds



  - Overview of ENERGY STAR financial tools
    - Cash Flow Opportunity calculator
    - Building Upgrade Value calculator
    - Financial Value calculator

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Week 6

- **Mid-term Student Project Progress Presentation**
  - Students give an oral report on project progress
  - By now:
    - Project buildings should have been benchmarked in Portfolio Manager
    - Draft financial reports calculated using the Cash Flow Opportunity calculator and Building Upgrade Value calculator
  - Discuss projects with class after presentations

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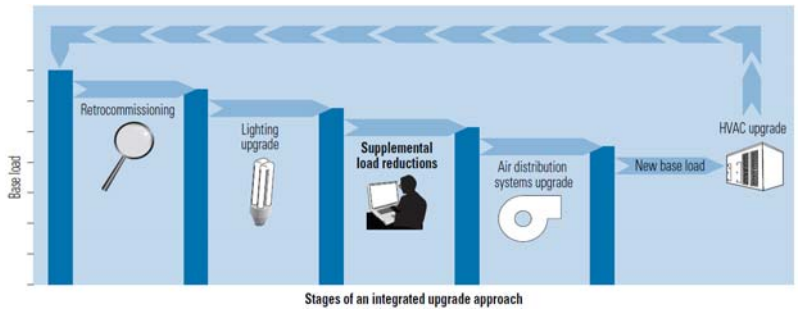
Week 7

- **Integrated Approach to Improving Energy Efficiency of a Building and Applying this to a Portfolio of Buildings**
  - Detailed look at how to improve commercial building energy efficiency using the ENERGY STAR Building Upgrade Manual



Stages of an integrated upgrade approach

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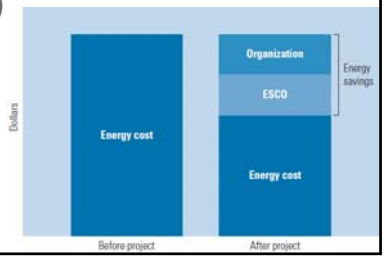
Week 8

- **Role of Energy Services Companies and Performance Contracting**
  - What is Energy Performance Contracting (EPC)?
  - Elements of an EPC
  - Brief history of EPC
  - EPC market, characteristics, and drivers
  - EPC financing
  - EPC monitoring and verification (M&V)
  - EPC market constraints
  - ENERGY STAR performance contracting best practices
  - When an ESCO is needed



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Week 9

- **Role of Building Occupants to Improve and Maintain Energy Efficiency**

  - Public perceptions about energy efficiency
  - Ways to engage occupants in energy efficiency
  - Partner success stories
  - EPA's National Building Competition
  - How local governments are engaging their communities and workforces

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Week 10

- **Bringing Energy Efficiency to Scale with ENERGY STAR—the Role of Federal Agencies, States, Local Governments, and Utilities**
  - How do we achieve energy-efficient commercial buildings? More! Faster!
  - Using Portfolio Manager to support:
    - Voluntary commercial building competitions
    - Grant programs
    - Local or state government benchmarking and disclosure mandate
  - Assessing sustainability of Federal buildings with Portfolio Manager
  - Using custom reports in Portfolio Manager to support mandates and voluntary campaigns
  - How you can get involved

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Week 11

- **Energy Efficiency and the Future— Final Presentation and Discussion of Current Events**
  - Students give final presentations on student projects
  - Hand in final written report
  - Discuss current events surrounding the energy efficiency of commercial buildings
  - Review how we can help increase the energy efficiency of buildings of current and future employment locations

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Getting Started and Next Steps

- To request materials, please contact:

  Katy Hatcher, hatcher.caterina@epa.gov
  EPA ENERGY STAR National Manager
  for the Public Sector

- Add this course to your school's catalog in time for 2012 registration!

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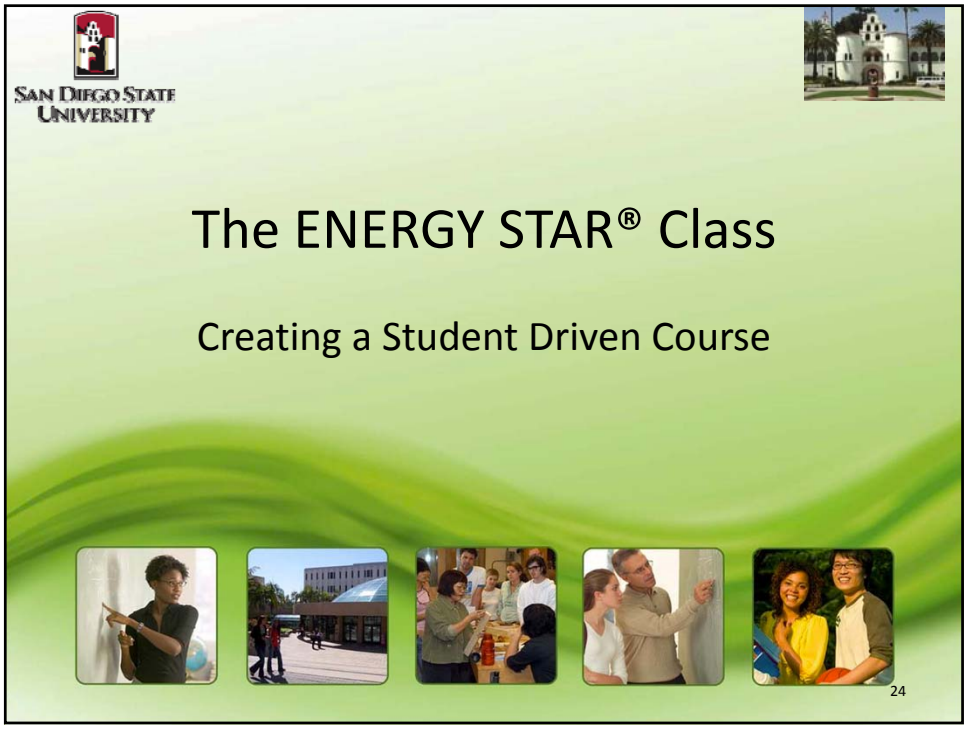

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Today's Speakers

- Daryl DeJean, Instructor
  - President, Emerging Technologies Associates, Inc.
- Mariah Hudson
  - Assistant Director Center for Regional Sustainability
- The Student Representatives
  - Matt Johnson
  - Stephanie Guinnane
  - Rachel Kreamer

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- How many on the call have incorporated ENERGY STAR into your academic course offering?

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Just The Basics

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Discussion Points

- How did the class come about?
- The ENERGY STAR curriculum
- Experiences outside the classroom
- Vision for the university
- Class project: Lessons learned

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"The course came to fruition with efforts from students, faculty, administration and energy experts."
Kenzie McDonald

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Her Vision!

"Starting as a creative idea to integrate tangible experiential energy efficiency work and a certification process known as ENERGY STAR, this course has transformed the basic idea of an energy class into a hands on, holistic approach to energy efficiency and sustainable business practices…..With enthused feedback from the students, we then brought the course manual….to the Dean of Undergraduate Affairs and his staff, who helped to guide the course into existence. I hope this course multiplies and spreads throughout the country to enable tangible experience and energy knowledge that is applicable to every professional sector."
Kenzie McDonald – SDSU Green Campus Team Leader Fall 2011

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Student Leaders

Sarah Tuley:
B.S. Environmental Engineering, Green Campus: Treasurer; Enviro-Business society- VP Green Research; Engineers Without Borders - Outreach Coordinator

Mathew Johnson: B.S. Environmental Studies and Sustainability
Enviro-Business Society- PresidentA.S. Sustainability Advisory Board- Voting Member
Environmental Health and Safety Board- Voting Member
GreeFest Executive Board- Voting Member
Sigma Phi Epsilon

Christopher Hathaway:
B.S. Student, Environmental Engineering, United States Green Building Council: President

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The Class

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Student Perspective

"Over the years, Green Campus, the Enviro-Business Society and a handful of other "green minded" students advocated for a curriculum that included sustainability and more specifically energy management." Mat Johnson

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Student Perspective

"I recognized the significance of this class from the onset ….Energy Management is becoming more and more important every day and I feel the skill set I acquired during this semester is invaluable." Mat Johnson

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University Perspective

Definitely a student led Initiative!

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The Faculty and Staff

Geoffrey Chase, Ph.D.
Dean , Division of Undergraduate Studies
Director, Center for Regional Sustainability

Mariah Hudson, Assistant Director
Center for Regional Sustainability

Jose Preciado
Director, Service Learning Program

Bill Lekas, Energy Manager
Physical Plant

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San Diego Gas & Electric

Yvonne (Bonnie) Moreno
Energy Program Advisor
Energy Innovation Center

SDGE
A Sempra Energy utility℠

Provided supplemental funding

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Recognized Need

PUBLIC UTILITIES COMMISSION · EUREKA · STATE OF CALIFORNIA

Wednesday, December 8, 2010 • UC Berkeley Clark Kerr Campus Conference Center

Workforce Strategies, Energy Efficiency, and Green Jobs:

A summit to discuss needs, challenges, and opportunities in California

UC BERKELEY LABOR CENTER

Funded by California utility ratepayers under the auspices of the California Public Utilities Commission

Energy Workforce Sector Strategy

Implementing the long term energy efficiency goals of the CPUC

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ENERGY STAR®, a U.S. Environmental Protection Agency program, helps us all save money and protect our environment through energy efficient products and practices. For more information, visit www.energystar.gov.

San Diego State University
Course Syllabus

CLASS IDENTIFICATION

TITLE: **Greening the Built Environment through Energy Management: Creating and Effective Strategy and Implementation Plan**

PREFIX/SECTION: GEN S 350 Schedule #30217
CREDIT HOURS: 3
CLASS BEGINS/ENDS: 1/23/12 to 5/07/12
MEETING DAY(S)/TIMES: Mondays 3:30 to 6:10 PM

CONTACT INFORMATION

INSTRUCTOR NAME: Daryl DeJean
TELEPHONE: 619 218 5522
EMAIL ADDRESS: darylldejean@gmail.com

COURSE DESCRIPTION:

This course is designed to introduce students to commercial energy management, to include leadership roles in energy management and sustainability. Through lectures and hands-on research-based experiences, students will develop an effective energy management strategy and implementation tools. An in-depth look into EPA's ENERGY STAR program will be provided. Topics will include, but are not limited to: current trends in commercial building energy efficiency, transforming the market with ENERGY STAR, ENERGY STAR Guidelines for Energy Management, rating building energy efficiency with Portfolio Manager, best energy efficiency practices, engaging employees in energy conservation, and tracking energy savings and greenhouse emissions reductions over time. This course will include hands-on learning opportunities such as measuring the energy use of an actual building and identifying energy efficiency opportunities.

COURSE RATIONALE:

Students will learn how improve energy productivity and eliminating energy waste can help improve the profitability and/or fiscal responsibility of an organization. The skills learned and developed by students through this course will prove valuable in their future workplace.

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VI. Project Financing (Week 10)

Upon completion of this unit, you will:

A. Explain potential sources for funding projects.
B. Explain the basic elements or requirements of these various funding sources.
C. Explain how to integrate the funding available from the various sources to finance projects.

VII. Bringing Energy Efficiency to Scale with ENERGY STAR — The Market Drivers (Week 11)

Upon completion of this unit, you will:

A. Explain how federal agencies, states, local governments, and utilities can work together to help advance energy efficiency.
B. Understand the regulations, codes, standards, local ordnances, programs, etc. provide drivers for energy efficiency.
C. Discuss solutions to these barriers and related policies and practices.

VIII. Assessments and Audits (Week 12)

Upon completion of this unit, you will:

A. Explain the difference between an energy assessment and audit.
B. Understand the role of an assessment and audit in an energy management plan.
C. Learn how to use the findings in an assessment or audit in internal sales presentations seeking approval of energy efficiency projects.

IX. Presenting to the Board (Week 13)

Upon completion of this unit, you will:

A. Explain how to effectively present an energy efficiency project to the Board.
B. Present a project under consideration to the class.
C. Understand the impact of energy efficiency upon the overall strategy of the business.

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Outside the Classroom

- 980,000 square foot medical center
- Received ENERGY STAR 2010, 2011
- Outreach event planned with students 5/21/2012
- Volunteer internship program established

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The Goal:

Energy Management

Jon Coger
Energy Manager
VA Medical Center
San Diego, CA

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IES Los Angeles Networking

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Future Vision

"I hope the University adopts this course to be used as an elective for most if not all majors."

Brandon Schlueter

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Future Vision

Raising the Bar

"…the university continues to expand its Sustainability curriculum becoming a leader in the field setting the bar for all higher education as we transition into a unique period in geologic time."

Mat Johnson

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University Perspective: Future Vision

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Class Project

- Apply Course to Benchmarking Campus
  - Student leaders formed teams to assign buildings to validate building square footage, operating characteristics and physical characteristics
  - Developed a methodology to gather operating and physical characteristics

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Project Results

- 15 buildings benchmarked to date
  - goal is 25 by end of the semester
- 742,247 square feet
- 12% of university's 5,980,000 square feet

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Lessons Learned

The key to success!

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Information Guru

Rebeca Martinez
International Business Major with an emphasis in marketing
Member of the SDSU University Honors Program Student Society
Member of Phi Eta Sigma national honor society.

This project has opened up my understanding of energy monitoring and its importance in validating efficiency, project development and energy conservation.

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Wanting to Share the Knowledge

Javier Vizcaya
B.S. Electrical Engineering
Society Hispanic Professional Engineers
Institute of Electrical and Electrical Engineers

Norberto Ruvalcaba
B.S. Civil Engineering Student
Green Campus Intern
U.S. Green Building Council
American Society of Civil Engineers

Brandon Schlueter,
B.S. Civil Engineering,
Three years as president of SDSU Mens Club Soccer.

Matthew Johnson
B.S. Environmental Studies and Sustainability
Enviro-Business Society- President A.S. Sustainability Advisory Board- Sigma Phi Epsilon

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Ready to Make a Difference

Rachel Kreamer, B.A. Quantitative Economics, Political Science; United States Green Building Council (San Diego State): Outreach Coordinator, Historian; A.S. Sustainability Advisory Board; Pi Sigma Alpha, The National Political Science Honor Society; Omicron Delta Epsilon, The International Honor Society for Economics

Stephanie Guinnane, B.A. International Security and Conflict Resolution, Green Campus intern, Student Sustainability Coordinator.

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Spreading the Message!

"ENERGY STAR MAGIC"

Written by: Shawn Rolph and Mat Johnson
Performed by: Shawn Rolph
Concept by: Daryl DeJean and The Class

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THANK YOU!

Daryl DeJean
daryldejean@gmail.com
www.emergingtechnologiesassociates.com

Mariah Hudson
Sustainability Coordinator, Center for Regional Sustainability
mhudson@mail.sdsu.edu

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