Chair: Tracy Christofero | **GC#6: Course Addition**

Request for Graduate Course Addition

1. Prepare one paper copy with all signatures and supporting material and forward to the Graduate Council Chair.
2. E-mail one identical PDF copy to the Graduate Council Chair. If attachments included, please merge into a single file.
3. ***The Graduate Council cannot process this application until it has received both the PDF copy and the signed hard copy.***

College: CITE | Dept/Division: Engineering | Alpha Designator/Number: ME649 | (•) Graded ( ) CR/NC

Contact Person: Asad Salem | Phone: 696-3207

NEW COURSE DATA:

New Course Title: Sustainable Energy Management

Alpha Designator/Number: M E 6 4 9

Title Abbreviation: S u s t a i n a b l e E n e r g y M g m t

(Limit of 25 characters and spaces)

Course Catalog Description: (Limit of 30 words)

Sustainable energy management, provides an overview of mechanical and control systems within buildings with sub-systems which possess a visible energy signature in terms of energy usage, inefficiency, and impact.

Co-requisite(s): None | First Term to be Offered: Spring-2016

Prerequisite(s): Graduate Status | Credit Hours: 3

Course(s) being deleted in place of this addition (*must submit course deletion form*):

Signatures: if disapproved at any level, do not sign. Return to previous signer with recommendation attached.

Dept. Chair/Division Head _____	Date _____
Registrar _____	Date _____
College Curriculum Chair _____	Date _____
Graduate Council Chair _____	Date _____

Request for Graduate Course Addition - Page 2

College: CITE | Department/Division: ENGINEERING | Alpha Designator/Number: ME-649

Provide complete information regarding the new course addition for each topic listed below. Before routing this form, a complete syllabus also must be attached addressing the items listed on the first page of this form.

1. FACULTY: Identify by name the faculty in your department/division who may teach this course.

Asad Salem

2. DUPLICATION: If a question of possible duplication occurs, attach a copy of the correspondence sent to the appropriate department(s) describing the proposal. Enter "***Not Applicable***" if not applicable.

Not Applicable

3. REQUIRED COURSE: If this course will be required by another deparment(s), identify it/them by name. Enter "***Not Applicable***" if not applicable.

None

4. AGREEMENTS: If there are any agreements required to provide clinical experiences, attach the details and the signed agreement. Enter "***Not Applicable***" if not applicable.

Not Applicable

5. ADDITIONAL RESOURCE REQUIREMENTS: If your department requires additional faculty, equipment, or specialized materials to teach this course, attach an estimate of the time and money required to secure these items. (Note: Approval of this form does not imply approval for additional resources.) Enter "***Not Applicable***" if not applicable.

None

6. COURSE OBJECTIVES: (May be submitted as a separate document)

Please refer to the attached syllabus

7. COURSE OUTLINE (May be submitted as a separate document)

Please refer to the attached Syllabus

8. SAMPLE TEXT(S) WITH AUTHOR(S) AND PUBLICATION DATES (May be submitted as a separate document)

Hand Outs

9. EXAMPLE OF INSTRUCTIONAL METHODS (Lecture, lab, internship)

Lecture

10. EXAMPLE EVALUATION METHODS (CHAPTER, MIDTERM, FINAL, PROJECTS, ETC.)

Mid-term exams 50%
Assigements including Projects: 25%
Final Exam: 25%

11. ADDITIONAL GRADUATE REQUIREMENTS IF LISTED AS AN UNDERGRADUATE/GRADUATE COURSE

None

12. PROVIDE COMPLETE BIBLIOGRAPHY (May be submitted as a separate document)

- A Management System Standard for Energy, Georgia Tech Energy and Environmental Management Center. (www.ase.org/files/1152_file_brownpaper.pdf)
- ANSI/MSE 2000: A Single Standard for Diverse Business Sectors, Georgia Tech University. (https://txspace.tamu.edu/bitstream/1969.1/4565/1/ESL-HH-02-05-17.pdf)
- Lessons Learned from Case Studies of Six High-Performance Buildings, NREL, June 2006. (http://www.nrel.gov/docs/fy06osti/37542.pdf)
- Los Alamos National Laboratory Sustainable Design Guide, (http://www.eere.energy.gov/buildings/highperformance/pdfs/sustainable_guide/sustainable_guide_ch5.pdf)
- Procedure for Measuring and Reporting Commercial Building Energy Performance, NREL, October 2005. (http://www.nrel.gov/docs/fy06osti/38601.pdf)

Request for Graduate Course Addition - Page 5

Please insert in the text box below your course summary information for the Graduate Council agenda. Please enter the information exactly in this way (including headings):

Department:
Course Number and Title:
Catalog Description:
Prerequisites:
First Term Offered:
Credit Hours:

Department: Weisberg Division of Engineering
Course Number and Title: ME649 Sustainable Energy Management
Catalog Description:
Sustainable energy management, provides an overview of mechanical and control systems within buildings with sub-systems which possess a visible energy signature in terms of energy usage, inefficiency, and impact.

Prerequisite: Graduate status
First year Offered: Spring 2016
Credit Hours: 3

Course Title/Number	**ME 649: Sustainable Energy Management**
Semester/Year	
Days/Time	
Location	EL 101
Instructor	Dr. Asad Salem
Office	EL 108
Phone	304-696-3207
E-Mail	salema@marshall.edu
Office/Hours	
University Policies	By enrolling in this course, you agree to the University Policies listed below. Please read the full text of each policy be going to www.marshall.edu/academic-affairs and clicking on "Marshall University Policies." Or, you can access the policies directly by going to http://www.marshall.edu/academic-affairs/?page_id=802 Academic Dishonesty/ Excused Absence Policy for Undergraduates/ Computing Services Acceptable Use/ Inclement Weather/ Dead Week/ Students with Disabilities/ Academic Forgiveness/ Academic Probation and Suspension/ Academic Rights and Responsibilities of Students/ Affirmative Action/ Sexual Harassment

Catalog Course Description:

Sustainable energy management, provides an overview of mechanical and control systems within buildings with sub-systems which possess a visible energy signature in terms of energy usage, inefficiency, and impact.

Prerequisite: Graduate status

Required Text: None. Hand outs

References:

- A Management System Standard for Energy, Georgia Tech Energy and Environmental Management Center. (www.ase.org/files/1152_file_brownpaper.pdf)
- ANSI/MSE 2000: A Single Standard for Diverse Business Sectors, Georgia Tech University. (https://txspace.tamu.edu/bitstream/1969.1/4565/1/ESL-HH-02-05-17.pdf)
- Lessons Learned from Case Studies of Six High-Performance Buildings, NREL, June 2006. (http://www.nrel.gov/docs/fy06osti/37542.pdf)
- Los Alamos National Laboratory Sustainable Design Guide, (http://www.eere.energy.gov/buildings/highperformance/pdfs/sustainable_guide/sustainable_guide_ch5.pdf)
- Procedure for Measuring and Reporting Commercial Building Energy Performance, NREL, October 2005. (http://www.nrel.gov/docs/fy06osti/38601.pdf)

Course objectives

1. List the dominant energy resources currently being used
2. List potential future alternative energy resources and their current barriers to more extensive adoption

1. Appreciate the connection between current and future energy consumption and the environment, politics, economics, and society 2. Describe various emissions reduction technologies 3. Review, comprehend, describe, and critique current research and new publications relating to energy
4. Calculate basic energy and emission rates for Buildings 5. Conduct a basic economic analysis in order to compare competing options 6. Quantify energy resources and power generation rates for alternative energy technologies such as wind turbines, PV, and solar thermal 7. Assess the amount of energy one consumes and quantify the environment impact
8. Develop a short proposal for an energy option containing a simple analysis of both energy and environment impacts for a customer 9. Prepare a critical review of an emerging energy technology option 10. Research and debate a current energy issue

Course expected learning outcomes

Upon completion of this course, the students should be able to

1) Meet all the above objectives and
2) Apply engineering principles to assess and evaluate energy systems for maximum performance
4) Conduct a comprehensive economic assessment of energy conversion systems for Industrial and commercial applications
5) Modify or propose a new or alternative designs to enhance energy efficiency and reduce environmental impacts
6) Demonstrate energy assessment methods and communicate effectively by both oral and written presentations.

Course Outlines:

Part I: Energy Management and the Whole Building Design Process

1. ANSI/MSE 2000 System Requirements
2. Key performance indicators
3. Case studies where ANSI/MSE 2000 has been applied
4. Case studies by National Renewable Energy Lab of high-performance buildings

Part II: Energy modeling in the Build Environment (Design Builder/EnergyPlus)

5. Building energy modeling with Design Builder / Energy plus

Part III: The building envelope.

6. Building orientation and shape (area/volume)
7. Specific variables: U, R, SHGC, etc.
8. Conduction, convection and radiation losses/gains
9. Windows
10. Infiltration

Part IV: Solar gain management

11. Solar gain
12. Strategies to minimize solar gain (cooling environment)
13. Strategies to maximize solar gain (heating environment)

Part V: Lighting. Daylighting strategies

14. Lighting and luminaire types, characteristics and selection
15. Daylighting principles

Part VI: HVAC and Central Plant Systems

16. Heating and cooling load calculation
17. System types and selection (VAV/CAV/air dist. systems)
18. "Free" Cooling system
19. Evaporative cooling systems
20. Air to air energy recovery systems
21. Central Plant Systems

Part VII: Plumbing and Water Use

22. Indoor plumbing fixtures
23. Waste water recycling/reusing
24. Water consuming mechanical systems
25. Location specific considerations (i.e. rainwater harvesting system / desalination)

Part VIII: Electrical power and building control systems

Part IX: Energy Assessment and reporting

26. The energy assessment
27. How to report building energy performance

Grading:

Grading Basis:	Mid-term exams:	50%	A:	90-100%
	Assignments:	25%	B:	80-90%
	Final Exam:	25%	F:	0-60%

Homework and Academic Dishonesty Policy:

Homework assignments will be announced in class, and periodic in-class quizzes will be given. Late work is not accepted, except in cases of officially university-excused absences.

Students are expected to adhere to the Marshall University academic dishonesty policy, found in the undergraduate catalog. Academic dishonesty will not be tolerated, and infractions of the university academic dishonesty requirements will lead to sanctions and reporting to the Office of Academic Affairs. Students are particularly encouraged to be careful to avoid cheating, plagiarism, and complicity as related to homework assignments.

Copying homework is not allowed:

Acceptable Behavior	Unacceptable Behavior
☺ Discuss homework problems with others.	☹ Show someone every step of a problem.
☺ Check answers with other students.	☹ Hand your assignment to someone else.
☺ Help other students learn & find mistakes.	☹ Group working problems simultaneously*

* Since everyone works at a different speed, "group work" can degenerate into a slower student copying a faster one, without really understanding what is going on. Quizzes and exams are taken individually, so it is important for students to learn how to solve problems on their own. **Incoming homework assignments will be screened for inappropriate collaboration.**

Additional Academic Policies:

Marshall University policies pertaining to Academic Dishonesty, Excused Absences, University Computing Services Acceptable Use, Inclement Weather, Dead Week, Students with Disabilities, Academic Dismissal,

Academic Forgiveness, Academic Probation and Suspension, Academic Rights and Responsibilities of Students, Affirmative Action, and Sexual Harassment can be found at:
http://www.marshall.edu/academic-affairs/?page_id=802

ABET Program Outcomes:

(a-2) an ability to apply knowledge of mathematics, science, and engineering
(c-3) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
(d-2) an ability to function on multidisciplinary teams
(e-3) an ability to identify, formulate, and solve engineering problems
(f-1) an understanding of professional and ethical responsibility
(g-2) an ability to communicate effectively
(h-2) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context