



UNDERGRADUATE CURRICULUM CHANGE MEMO


Date: August 30, 2022

From: Methaq S. Abed, Aerospace and Mechanical Engineering 

Through: Jack Chessa, Department Chair, Aerospace and Mechanical Engineering 

Through: Virgilio Gonzalez, Chair, Curriculum Committee, College of Engineering

Through: Louis J. Everett, Associate Dean for Academic Affairs and Undergraduate Studies, College of Engineering

Through: Kenith Meissner, Dean College of Engineering 

To: Chair of University Curriculum Committee

Proposal Title: Adding Renewable Energy Course, MECH 4390

The Aerospace and Mechanical Engineering Department proposes adding a new technical elective course in the area of thermal fluid. The course title is Renewable Energy, which has been offered for the past three semesters under the Special Topics in Thermal Fluid area. Adding the course under the title of Renewable Energy will benefit the students by giving a record of this course on their transcripts. A good number of students have been enrolled for this course.

The Renewable Energy, MECH 4390, is a senior-level course and requires two prerequisites; these are MECH 3312 (Thermodynamics) with a grade of "C" or better, and MECH 3314 (Fluid Mechanics) with a grade of "C" or better. The new degree plan is attached to this proposal.

CURRICULUM CHANGE PROPOSAL

APPROVAL PAGE

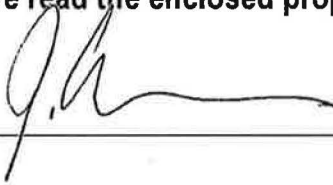
Proposal Title: Adding Renewable Energy Course, MECH 4390

College: Engineering

Department: Aerospace and Mechanical Engineering

DEPARTMENT CHAIR

I have read the enclosed proposal and approve this proposal on behalf of the department.



August 31st, 2022

Signature

Date

COLLEGE CURRICULUM COMMITTEE CHAIR

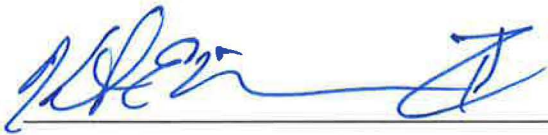
I have read the enclosed documents and approve the proposal on behalf of the college curriculum committee.

Signature

Date

COLLEGE DEAN

I have read the enclosed documents and approve the proposal on behalf of the college. I certify that the necessary funds will be allocated by the college in support of this proposal.



9/19/2022

Signature

Date

COURSE ADD

All fields below are required

College : Engineering

Department : Aerospace and Mechanical

Effective Term : Spring 2023

Rationale for adding the course:

Needed for the new degree plan: Provides experience in renewable energy.

All fields below are required

Subject Prefix and # MECH 4390

Title (29 characters or fewer): Renewable Energy

Dept. Administrative Code : 0117

CIP Code 14.1901.00

Departmental Approval Required Yes No

Course Level UG GR DR SP

Course will be taught: Face-to-Face Online Hybrid

Course minimum grade: if N leave blank, if Y provide grade D

- How many times may course be repeated to satisfy minimum grade requirement? 2

How many times may the course be taken for credit? (Please indicate 1-9 times): 1

Should the course be exempt from the "Three Repeat Rule?" Yes No

Grading Mode: Standard Pass/Fail Audit

Description and 2-3 keywords (600 characters maximum):

(Keywords are for Facilitation of course searches and should be words not already included in course title or description)

The course covers the fundamentals of renewable energy technologies that utilize solar, wind, hydro, geothermal, biomasses, and ocean energy resources.

Contact Hours (per week): 3 Lecture Hours 0 Lab Hours Other

Types of Instruction (Schedule Type): Select all that apply

- | | |
|---|--|
| <input checked="" type="checkbox"/> A Lecture | <input type="checkbox"/> H Thesis |
| <input type="checkbox"/> B Laboratory | <input type="checkbox"/> I Dissertation |
| <input type="checkbox"/> C Practicum | <input type="checkbox"/> K Lecture/Lab Combined |
| <input type="checkbox"/> D Seminar | <input type="checkbox"/> O Discussion or Review (Study Skills) |

- E Independent Study
- F Private Lesson

- P Specialized Instruction
- Q Student Teaching

Fields below if applicable

If course is taught during a part of term in addition to a full 16-week term please indicate the length of the course (ex., 8 weeks):

TCCN (Use for lower division courses) :

Prerequisite(s):		
Course Number/ Placement Test	Minimum Grade Required/ Test Scores	Concurrent Enrollment Permitted? (Y/N)
MECH 3312	C	N
MECH 3314	C	N

Corequisite Course(s):

Equivalent Course(s):

Restrictions:	
Classification	
Major	

The curriculum office recommends consulting with other programs to determine whether there is significant overlap between the proposed course and any existing courses, especially when the course is part of an interdisciplinary program. Evidence of this consultation will facilitate the work of the curriculum committees.

B.S. Mechanical Engineering

Degree Plan

Required Credits: 128

Code	Title	Hours
University Core Curriculum		
Complete the University Core Curriculum requirements.		42
Mechanical Engineering Designated Core (All courses require a grade of C or better.)		
CE 2326 Econ for Engrs & Scientists is a designated core course. It is required for graduation even if other course is used to fulfill the core. All Mechanical Engineering majors are encouraged to take CE 2326 to fulfill the core.		
Required Courses:		
CE 2326	Econ for Engrs & Scientists	3
CHEM 1305 & CHEM 1105	General Chemistry and Laboratory for CHEM 1305	4
MATH 1508 or MATH 1310 or MATH 1411	Precalculus ((Listed if completed, but not required)) Trigonometry and Conics Calculus I	3-5
PHYS 2320 PHYS 2120	Introductory Mechanics Laboratory for PHYS 2320	3 1
Mechanical Engineering (Other Requirements) (All courses require a grade of C or better.)		
Required Courses:		
MATH 1411	Calculus I	4
MATH 1312	Calculus II	3
MATH 2313	Calculus III	3
MATH 2326	Differential Equations	3
Science Elective		
Select one of the following options:		4
BIOL 1305 & BIOL 1107 CHEM 1306 & CHEM 1106 PHYS 2321 & PHYS 2121	General Biology and Topics in Study of Life I ^c General Chemistry and Laboratory for CHEM 1306 ^c Introductory Electromagnetism and Laboratory for PHYS 2321	
MATH/Science Elective		
Select one of the following:		

Code	Title	Hours
BIOL 1306	Organismal Biology	
MATH 3323	Matrix Algebra	
MATH 3335	Applied Analysis I	
MATH 4329	Numerical Analysis	
MATH 4336	Applied Analysis II	
PHYS 2325	Survey of Modern Physics	
PHYS 3351	Analytical Mechanics I	
STAT 3320	Probability and Statistics	
MATH Elective		
Select one of the following:		
MATH 3323	Matrix Algebra	
MATH 3335	Applied Analysis I	
MATH 4329	Numerical Analysis	
MATH 4336	Applied Analysis II	
STAT 3320	Probability and Statistics	
Mechanical Engineering Major		
Required Courses: ¹		
MECH 1305	Graphic & Design Fundamentals ^c	3
MECH 1321	Mechanics I-Statics ^c	3
or CE 2315	Statics	
MECH 2103	Engineering Computations ³	1
MECH 2311	Intro to Thermal-fluid Sci ^c	3
MECH 2322	Mechanics of Materials ^c	3
or CE 2334	Mechanics of Materials	
MECH 2331	Matl & Manufacturing Processes ^c	3
MECH 2340	Mechanics II -Dynamics ^c	3
MECH 2342	Electro Mechanical Systems ^c	3
or EE 2350	Electric Circuits I	
MECH 3312	Thermodynamics ³	3
MECH 3314	Fluid Mechanics ³	3
MECH 3334	Mechanical Design ³	3
MECH 3345	System Dynamics ³	3
MECH 3352	Engineering Analysis II ³	3
MECH 4315	Heat Transfer ³	3
MECH 4366	Senior Design Project ^{2,3}	3

Select one of the following:

Code	Title	Hours
MECH 2131	Manufacturing Engineering Lab ^e	1
MECH 2132	Additive Manufacturing Lab ^e	1
MECH 2133	Metal Casting Lab ^e	1
MECH 2134	Intelligent Manufacturing Lab	1
Select two of the following:		
MECH 3103	Mechatronics Lab ³	1
MECH 3113	Thermo-fluid Lab ³	1
MECH 3123	Solid Mechanics Lab ³	1
Select one of the following:		
MECH 4326	Finite Element Analysis ³	3
MECH 4328	Intro to LabVIEW	3
MECH 4330	Dynamic Systems Simulation ³	3
MECH 4392	Special Topics in Computation ³	3
Select five of the following (minimum of one from each area):		
Solid Mechanics Area		
AERO 3323	Aerospace Structures I	3
AERO 4313	Aerospace Structures II	3
MECH 4336	Principles of Engr Design ³	3
MECH 4395	Special Topics in Mech. Engr. ³	3
MECH 4370	Pre-Professional Experiences	3
Thermal Fluid Area		
AERO 3312	Aerodynamics I	3
AERO 4331	Aerodynamics II	3
MECH 4316	Thermal System Design ³	3
MECH 4390	<u>Renewable Energy</u> ³	3
MECH 4394	Special Topics in Therm Fluid ³	3
Electro-Mechanical Area		
AERO 3343	Systems Modelling and Control	3
MECH 4332	MECH Comp App Vision Robotics	3
MECH 4334	Mechanical Systems Control	3
MECH 4345	Comm & Mech Sensor Protocols	3
MECH 4346	Mechatronics ³	3
MECH 4393	Special Topics in Elect-Mech ³	3
Total Hours		128
Course List		

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Renewable Energy
MECH 4394 (CRN 19306)
Course Syllabus
Fall 2022

COURSE OBJECTIVES: Renewable energy is the fastest-growing energy source in the United States, increasing 100% from 2000 to 2018. In 2019, U.S. renewable energy consumption surpassed coal. The course covers fundamentals of renewable energy technologies that utilize solar, wind, hydro, geothermal, biomass, and ocean energy resources.

TIME: TR 3:00 pm – 4:20 pm

LOCATION: LART 211

INSTRUCTOR: Dr. Evgeny Shafirovich

E-MAIL: eshafirovich2@utep.edu

OFFICE: A112

OFFICE HOURS: TR 11:00 am – 12:00 pm, 1:00 pm – 2:00 pm

TEXTBOOK: M. Kanoglu, Y.A. Cengel, and J.M. Cimbala, *Fundamentals and Applications of Renewable Energy*, McGraw Hill, 2020, ISBN: 978-1-260-45530-4

BLACKBOARD: Instructor will be using Blackboard for uploading lectures and other materials, updating the syllabus if necessary, and communicating with students via announcements and email.

TESTS: There are six tests with multiple choice questions. They will be conducted in class during regular class hours (open books, open notes). There is no final (comprehensive) exam in this course.

GRADING: To adjust the results of tests with multiple-choice questions to the grade-score system commonly used in the U.S., the score in each test will be determined using the following formula:

$$\text{Score (\%)} = \left(1 + \frac{\text{Number of obtained points}}{\text{Maximum number of points}} \right) \cdot 50\%$$

The score for the course will be determined as the average of your scores in the five tests (from Test 2 through Test 6). Good results in Test 1 may give you an additional credit.

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COURSE CALENDAR

Week	Day	Date	Lecture	Topic	Assigned Reading
1	T	8/23	1	Overview. Why renewable energy?	Ch. 1 and slides
1	R	8/25	2	First and second laws of thermodynamics	Ch. 2 and slides
2	T	8/30	3	Entropy	Ch. 2 and slides
2	R	9/1	4	Exergy	Ch. 2 and slides
3	T	9/6	5	Thermochemistry	Ch. 2 and slides
3	R	9/8	6	Heat transfer	Ch. 2 and slides
4	T	9/13	7	Energy and power units, primary and secondary energy sources, energy lifecycle Test 1: Lectures 1 - 6	Slides
4	R	9/15	8	<i>Review of Test 1.</i> Fossil fuels	Slides
5	T	9/20	9	Nuclear energy	Slides
5	R	9/22	10	Wind energy	Ch. 5 and slides
6	T	9/27	11	Wind energy Test 2: Lecture 7, Fossil, and Nuclear	Ch. 5 and slides
6	R	9/29	12	<i>Review of Test 2.</i> Hydropower	Ch. 6 and slides
7	T	10/4	13	Geothermal energy	Ch. 7 and slides
7	R	10/6	14	Geothermal energy	Ch. 7 and slides
8	T	10/11	15	Biomass energy Test 3: Wind and Hydro	Ch. 8 and slides
8	R	10/13	16	<i>Review of Test 3.</i> Biomass energy	Ch. 8 and slides
9	T	10/18	17	Ocean energy	Ch. 9 and slides
9	R	10/20	18	Fundamentals of solar energy	Ch. 3 and slides
10	T	10/25	19	Solar energy applications Test 4: Geothermal and Biomass	Ch. 4 and slides
10	R	10/27	20	Solar energy applications <i>Review of Test 4</i>	Ch. 4 and slides
11	T	11/1	21	Solar energy applications	Ch. 4 and slides
11	R	11/3	22	Solar energy applications	Ch. 4 and slides
12	T	11/8	23	Energy storage	Slides
12	R	11/10	24	Energy storage	Slides
13	T	11/15	25	Hydrogen and fuel cells Test 5: Ocean and Solar	Ch. 10 and slides
13	R	11/17	26	Energy and the environment <i>Review of Test 5</i>	Ch. 12 and slides
14	T	11/22	27	Energy and the environment	Ch. 12 and slides
14	R	11/24		<i>Thanksgiving Day</i>	
15	T	11/29		Test 6: Energy Storage, Hydrogen and Fuel Cells, Energy and Environment	
15	R	12/1		<i>Review of Test 6</i>	

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SCHOLASTIC INTEGRITY

Academic dishonesty is prohibited and is considered a violation of the UTEP Handbook of Operating Procedures. It includes, but is not limited to, cheating, plagiarism, and collusion. Cheating may involve copying from or providing information to another student, possessing unauthorized materials during a test, or falsifying research data on laboratory reports. Plagiarism occurs when someone intentionally or knowingly represents the words or ideas of another as one's own. Collusion involves collaborating with another person to commit any academically dishonest act. Any act of academic dishonesty attempted by a UTEP student is unacceptable and will not be tolerated. All suspected violations of academic integrity at The University of Texas at El Paso must be reported to the Office of Student Conduct and Conflict Resolution (OSCCR) for possible disciplinary action. To learn more, please visit [HOOP: Student Conduct and Discipline](#).

ACCOMMODATIONS POLICY

The University is committed to providing reasonable accommodations and auxiliary services to students, staff, faculty, job applicants, applicants for admissions, and other beneficiaries of University programs, services and activities with documented disabilities in order to provide them with equal opportunities to participate in programs, services, and activities in compliance with sections 503 and 504 of the Rehabilitation Act of 1973, as amended, and the Americans with Disabilities Act (ADA) of 1990 and the Americans with Disabilities Act Amendments Act (ADAAA) of 2008. Reasonable accommodations will be made unless it is determined that doing so would cause undue hardship on the University. Students requesting an accommodation based on a disability must register with the [UTEP Center for Accommodations and Support Services \(CASS\)](#). Contact the Center for Accommodations and Support Services at 915-747-5148, or email them at cass@utep.edu, or apply for accommodations online via the [CASS portal](#).

COVID-19 PRECAUTIONS

Please stay home if you have been diagnosed with COVID-19 or are experiencing COVID-19 symptoms. If you are feeling unwell, please let me know as soon as possible, so that we can work on appropriate accommodations. If you have tested positive for COVID-19, you are encouraged to report your results to covidaction@utep.edu, so that the Dean of Students Office can provide you with support and help with communication with your professors. The Student Health Center is equipped to provide COVID 19 testing.

The Center for Disease Control and Prevention recommends that people in areas of substantial or high COVID-19 transmission wear face masks when indoors in groups of people. The best way that Miners can take care of Miners is to get the vaccine. If you still need the vaccine, it is widely available in the El Paso area, and will be available at no charge on campus during the first week of classes. For more information about the current rates, testing, and vaccinations, please visit epstrong.org