SEE6104: ENERGY CONSERVATION AND AUDIT

Effective Term
Semester A 2025/26

Part I Course Overview

Course Title
Energy Conservation and Audit

Subject Code
SEE - School of Energy and Environment
Course Number
6104

Academic Unit
School of Energy and Environment (E2)

College/School
School of Energy and Environment (E2)

Course Duration
One Semester

Credit Units
3

Level
P5, P6 - Postgraduate Degree

Medium of Instruction
English

Medium of Assessment
English

Prerequisites
Nil

Precursors
Nil

Equivalent Courses
Nil

Exclusive Courses
Nil

Part II Course Details

Abstract
This course aims to provide students with basic knowledge of energy conservation principles and the essential practices of energy auditing. Students are expected to gain an understanding of the global and local energy landscape, with emphasis

on the vital role of energy conservation in mitigating environmental impacts and enhancing sustainability. Students will learn the intricacies of energy auditing, covering its definition, methodologies, and instrumentation, and will be introduced to economic analysis techniques essential for evaluating the feasibility and impact of energy conservation measures. Energy audit procedures for various critical components and aspects, including boilers, steam-distribution systems, HVAC systems, lighting, electrical load management, buildings, and thermal considerations, are covered in the course. Renewable energy solutions are also introduced to equip students with the knowledge to integrate sustainable practices into energy conservation strategies.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Demonstrate a comprehensive understanding of energy conservation principles and their significance in achieving sustainability and reducing environmental impact	20	x	x	
2	Apply structured energy audit methodologies to analyze and evaluate energy consumption patterns in various industrial components and systems	30		x	x
3	Utilize economic and energetic analysis techniques to assess the feasibility and potential impact of energy conservation measures	30		x	x
4	Demonstrate the ability to integrate theoretical knowledge with practical applications by analyzing energy audit results and recommending appropriate energy conservation measures for specific industrial settings	20	x	x	x

A1: Attitude
Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability
Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments
Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Learning and Teaching Activities (LTAs)

	LTAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Lecture	Lectures are used to describe and illustrate the basic concepts and state-of-the-art methodologies	1, 2, 3, 4	2.5

2	Tutorial	Tutorials are used to solidify the concepts' understanding through examples, numerical exercises, case-studies, and discussions	1, 2, 3, 4	0.5
3	Project	Class project is used to implement the theoretical knowledge gained through lectures and tutorials to practical problems and demonstrate students' critical thinking	2, 3, 4	1

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks ("-" for nil entry)	Allow Use of GenAI?
1	Assignments/ Homework	1, 2, 3	10	-	Yes
2	Mid-term test	1, 2, 3	20	-	No
3	Project	2, 3, 4	30	-	Yes

Continuous Assessment (%)

60

Examination (%)

40

Examination Duration (Hours)

2

Minimum Continuous Assessment Passing Requirement (%)

30

Minimum Examination Passing Requirement (%)

30

Additional Information for ATs

To pass a course, a student must do ALL of the following:
1) obtain at least 30% of the total marks allocated towards coursework (combination of assignments, pop quizzes, term paper, lab reports and/ or quiz, if applicable);
2) obtain at least 30% of the total marks allocated towards final examination (if applicable); and
3) meet the criteria listed in the section on Assessment Rubrics.

Assessment Rubrics (AR)

Assessment Task

Assignments / Homework (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

Ability to analyze, calculate and solve problems in energy conservation and audit

Excellent

(A+, A, A-) Provide precise and comprehensive answers, without any or with negligible errors, showcasing a deep understanding of the subject matter

Good

(B+, B, B-) Provide accurate and well-explained answers, albeit with minimal errors, indicating a strong grasp of the subject matter

Fair

(C+, C, C-) Provide generally correct answers, but existing gaps are present in understanding or explanation

Marginal

(D) Provide some correct answers and mostly incorrect or incomplete answers, indicating significant gaps in understanding

Failure

(F) Provide answers that are largely incorrect or entirely missing, indicating a significant lack of comprehension

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Assessment Task

Mid-term test (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

Ability to analyze, calculate and solve problems in energy conservation and audit

Excellent

(A+, A, A-) Provide precise and comprehensive answers, without any or with negligible errors, showcasing a deep understanding of the subject matter

Good

(B+, B, B-) Provide accurate and well-explained answers, albeit with minimal errors, indicating a strong grasp of the subject matter

Fair

(C+, C, C-) Provide generally correct answers, but existing gaps are present in understanding or explanation

Marginal

(D) Provide some correct answers and mostly incorrect or incomplete answers, indicating significant gaps in understanding

Failure

(F) Provide answers that are largely incorrect or entirely missing, indicating a significant lack of comprehension

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Assessment Task

Project (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

Ability to apply energy auditing skills and analytical methods to real applications and propose practical energy conservation measures

Excellent

(A+, A, A-) Provide analysis that demonstrates a comprehensive understanding; Communicate findings and recommendations clearly and persuasively

Good

(B+, B, B-) Provide analysis that demonstrates a solid understanding; Communicate findings and recommendations clearly

Fair

(C+, C, C-) Provide analysis that demonstrates a basic understanding; Communicate findings and recommendations adequately

Marginal

(D) Provide analysis that demonstrates a limited understanding; Communicate findings and recommendations with limited effectiveness

Failure

(F) Provide analysis that demonstrates a lack of understanding; Fails to communicate findings and recommendations effectively

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Assessment Task

Final examination (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

Ability to analyze, calculate and solve problems in energy conservation and audit

Excellent

(A+, A, A-) Provide precise and comprehensive answers, without any or with negligible errors, showcasing a deep understanding of the subject matter

Good

(B+, B, B-) Provide accurate and well-explained answers, albeit with minimal errors, indicating a strong grasp of the subject matter

Fair

(C+, C, C-) Provide generally correct answers, but existing gaps are present in understanding or explanation

Marginal

(D) Provide some correct answers and mostly incorrect or incomplete answers, indicating significant gaps in understanding

Failure

(F) Provide answers that are largely incorrect or entirely missing, indicating a significant lack of comprehension

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Assessment Task

Assignments / Homework (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

Ability to analyze, calculate and solve problems in energy conservation and audit

Excellent

(A+, A, A-) Provide precise and comprehensive answers, without any or with negligible errors, showcasing a deep understanding of the subject matter

Good

(B+, B) Provide accurate and well-explained answers, albeit with few errors, indicating a strong grasp of the subject matter

Marginal

(B-, C+, C) Provide mostly correct answers, but considerable gaps are present in understanding or explanation

Failure

(F) Provide answers that are largely incorrect or entirely missing, indicating a significant lack of comprehension

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Assessment Task
Mid-term test (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion
Ability to analyze, calculate and solve problems in energy conservation and audit

Excellent
(A+, A, A-) Provide precise and comprehensive answers, without any or with negligible errors, showcasing a deep understanding of the subject matter

Good
(B+, B) Provide accurate and well-explained answers, albeit with few errors, indicating a solid grasp of the subject matter

Marginal
(B-, C+, C) Provide mostly correct answers, but considerable gaps are present in understanding or explanation

Failure
(F) Provide answers that are largely incorrect or entirely missing, indicating a significant lack of comprehension

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Assessment Task
Project (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion
Ability to apply energy auditing skills and analytical methods to real applications and propose practical energy conservation measures

Excellent
(A+, A, A-) Provide analysis that demonstrates a comprehensive understanding; Communicate findings and recommendations clearly and persuasively

Good
(B+, B) Provide analysis that demonstrates a solid understanding; Communicate findings and recommendations clearly

Marginal
(B-, C+, C) Provide analysis that demonstrates a basic understanding; Communicate findings and recommendations adequately

Failure
(F) Provide analysis that demonstrates a lack of understanding; Fails to communicate findings and recommendations effectively

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Assessment Task
Final examination (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion
Ability to analyze, calculate and solve problems in energy conservation and audit

Excellent

(A+, A, A-) Provide precise and comprehensive answers, without any or with negligible errors, showcasing a deep understanding of the subject matter

Good

(B+, B) Provide accurate and well-explained answers, albeit with few errors, indicating a solid grasp of the subject matter

Marginal

(B-, C+, C) Provide mostly correct answers, but considerable gaps are present in understanding or explanation

Failure

(F) Provide answers that are largely incorrect or entirely missing, indicating a significant lack of comprehension

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Part III Other Information

Keyword Syllabus

- Energy conservation and effective energy management
- Energy audit: preliminary audit, detailed audit, audit instrumentation, industrial vs. commercial vs. residential audit
- Economic analysis
- Energy audit principles for various industrial components and systems: boilers, furnaces, steam-distribution, compressed air, HVAC, lighting, electrical load management, buildings, power plant
- Thermal energy management: waste heat recovery, insulation, storage
- Renewable energy solutions for energy conservation

Reading List

Compulsory Readings

	Title
1	Nil

Additional Readings

	Title
1	Stephen A. Roosa, Steve Doty and Wayne C. Turner, Energy Management Handbook, 9th Edition, River Publishers, 2018.
2	Frank Kreith and D. Yogi Goswami, Energy Management and Conservation Handbook, 2nd Edition, CRC Press, 2017.
3	Anil Kumar, Om Prakash, Prashant Singh Chauhan, and Samsher, Energy Management: Conservation and Audits, 1st Edition, CRC Press, 2020.
4	Albert Thumann and William J. Younger, Handbook of Energy Audits, 6th Edition, The Fairmont Press, 2003.
5	Clive Beggs, Energy Management, Supply and Conservation, 2nd Edition, Elsevier, 2009.
6	L. Ashok Kumar and Gokul Ganesan, Energy Audit and Management, 1st Edition, CRC Press, 2023.
7	EMSD. Code of Practice for Energy Efficiency of Air Conditioning Installations. (latest revision)
8	EMSD. Code of Practice for Energy Efficiency of Electrical Installations. (latest revision)
9	EMSD. Code of Practice for Energy Efficiency of Lighting Installations. (latest revision)
10	EMSD. Energy Audit Code. (latest revision)
11	EMSD. Building Energy Code. (latest revision)
12	EMSD. Hong Kong Energy End-use Data (latest version)