Course Overview

Energy has long been a topic of primary consideration in state policies, environment, independence and standard of living. Over 80 percent of global energy use comes from fossil fuels, which are limited in reserves and have adverse effects on the environment such as the climate change. Therefore, it is important to raise general awareness about energy, to have effective education programs on energy and to develop new technologies that will free the world from the dependence of fossil fuels in an economic way. Achieving the goal of zero-carbon economy depends on improving the renewable energy technologies while reducing their cost and to make energy efficiency a way of life. This requires continual investment in research and innovation in areas of energy with the greatest future impact.

Engineers commonly learn about the fundamentals of energy in thermodynamics classes. For this course to be effective and motivate future engineers to tackle energy related problems with confidence, the course should be relevant and should bring the real world to the classroom. The basic tools for energy and exergy analyses must be mastered to build confidence. Relating the basic concepts to everyday life and extending them to non-technical areas enhances learners' perspective and the level of interest. Exergy analysis is of utmost importance to identify waste in energy systems and potential areas of improvement with the highest return on investment.

Energy efficiency is long recognized as the cheapest, cleanest and most abundant energy resource with the highest return on investment. Therefore, it is one of the primary topics in energy policies and governmental intensive programs. Developing working mechanisms and forming partnerships with key players are essential for the widespread adoption of energy efficient applications.

Engineering is about innovation, and a culture of innovation is a must to become a knowledge society and to have a knowledge economy. Innovation may involve a business model and a new service as well as a new product. Teamwork and global cooperation are becoming increasingly important for effectiveness and competitiveness in research and innovation

Course Content

- Thermodynamics education: Bringing real world to classroom: Thermodynamics in a nutshell. Strategies to make thermodynamics relevant to students and an effective tool for practicing engineers. Real world applications with high pedagogical impact.
- Energy efficiency as an energy resource: Energy efficiency is the cheapest, cleanest, biggest, simplest, most economical, most local, most abundant energy resource. The huge impact of energy efficiency in the US since 1970s. Energy efficiency strategies in Europe. Common applications in industry. Holistic approach to renewable energy and energy efficiency.
- New developments in energy technologies: Current concentration areas of research and development in the general area of energy from solar technologies, artificial leaves, and battery technologies to nuclear fusion. EU energy initiative and Horizon 2020. Promising emerging energy technologies.
- Exergy analysis and social and philosophical implications of the 2nd law of thermodynamics: Energy and exergy. 1st and 2nd law efficiencies. Exergy analysis as an effective mechanism for identifying waste and potential areas of improvement in energy systems. Non-physical things that are confused with energy. Exergy analysis of mixing processes and its counterpart in social life in splitting and merging processes. Ontological implications of entropy and exergy.
- Engineering as innovation: Knowledge society and knowledge economy. Role of engineers in research and innovation. Innovation in products, business models and services. The scope of global cooperation in innovation. Brain circulation. The role of universities in science, engineering and innovation ecosystem.

Objectives

The primary objectives of this short course are as follows:

- Priming the participants on the fundamentals of thermodynamics and its real-world applications, and the pedagogical aspects.
- Demonstrating the power of energy efficiency with experience from all over the world and showing why it should be the first priority when drafting energy strategies.
- Providing a broad picture about the current state of energy technologies and the developments with promising future potential.
- Exposing participant to exergy analysis as an effective tool in identifying and economically minimizing waste in energy systems.
- Showing the relevance of engineering in innovation and knowledge economy from a global perspective.

GIAN
Global Initiative of Academic Networks

Ministry of Human Resource Development, Government of India

5 Days course on

Energy, Education and Innovation

March 12 - 16, 2018

Course Instructor

Prof. Yunus Çengel

Professor Emeritus, Department of Mechanical
University of Nevada, USA

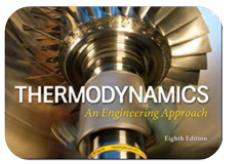
Course Coordinator

Dr. Shanmugam Dhinakaran

Department of Mechanical Engineering, IIT Indore, INDIA

Course Website: http://people.iiti.ac.in/~sdhina

For queries call: +91-9111 74 9191 (mobile)

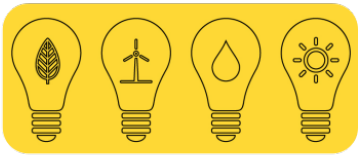


Thermodynamics


Artificial Leaf


Battery Technology


Solar Technology


Energy

The Centre for Fluid Dynamics

Department of Mechanical Engineering

INDIAN INSTITUTE OF TECHNOLOGY INDORE

Simrol, Indore, INDIA

Teaching Faculty

Yunus Çengel is a Professor Emeritus at the University of Nevada, Reno, USA. He received his Ph.D. in Mechanical Engineering from North Carolina State University, and served as a faculty member at the University of Nevada, Reno since 1984. He was the Director of the Industrial Assessment Center and served as consultant in the areas of energy efficiency, renewable energy, energy policies.

Professor Çengel is the author or co-author of the widely adopted textbooks Thermodynamics: An Engineering Approach, Fundamentals of Thermal-Fluid Sciences, Heat and Mass Transfer: Fundamentals and Applications, Fluid Mechanics: Fundamentals and Applications, Introduction to Thermodynamics and Heat Transfer, and Differential Equations for Scientists and Engineers all published by McGraw-Hill. Some of his textbooks have been translated into Chinese, Japanese, Korean, Thai, Spanish, Portuguese, Turkish, Italian, Greek, and French.

He is the recipient of several outstanding teacher awards, and he has received the ASEE Meriam/Wiley Distinguished Author Award twice. He is a registered Professional Engineer in the State of Nevada, USA.

Some of the widely adopted text books of Prof. Yunus Çengel worldwide.

Course Coordinator

Shanmugam Dhinakaran is an Associate Professor in the Department of Mechanical Engineering, IIT Indore, India. He received his PhD in the area of Computational Fluid Dynamics and Heat Transfer from IIT Kharagpur, India in 2008. He had worked as a post doctoral researcher at the Université de Pau et des Pays de L'Adour, France; Universidade do Minho, Portugal; Faculdade de Engenharia da Universidade do Porto, Portugal and Université de Valenciennes et du Hainaut-Cambresis, France before joining IIT Indore as an Assistant Professor in 2012.

Dr. Dhinakaran is also an adjunct faculty in the Department of Biosciences and Biomedical Engineering, IIT Indore. He is the coordinator of The Centre for Fluid Dynamics, IIT Indore. Computational Fluid Dynamics, Non-Newtonian fluid mechanics, Porous media, Nanofluids and Cardiovascular diseases are his research interests.

Who should attend?

- Executives, engineers and researchers in the broad area of energy from manufacturing, service and government organizations including R&D laboratories.
- Students at all levels (B.Tech/M.Sc/M.Tech/PhD) or Faculty from reputed academic institutions and technical institutions.

If you wish to know whether you are eligible to attend this course, please contact the course coordinator.

Examination & Certificate

An examination will be conducted at the end of the course and grade sheet as well as participation certificate will be give to all the participants.

Travel Information

IIT Indore located in Indore, central part of India. It will well-connected by rail, road and air. The nearest railway station is Indore Junction and the nearest Airport is Devi Ahilyabhai Holkar Airport. For queries regarding travel information, please contact the course coordinator/visit the course website.

Registration Fee

Students	Rs. 7,500
Research Scholars	Rs. 10,000
Faculty members	Rs. 15,000
Industry, R&D Organizations	Rs. 35,000

Fee concession may be given to few eligible candidates up on request, based on seat availability. Please contact the course coordinator for further information.

How to Register?

1. Send an e-mail to the coordinator (sdhina@iiti.ac.in) expressing your interest and wait for acceptance.
2. If accepted, pay the relevant fee online or through DD

Important dates and venue

Last date for Registration	March 11, 2018
Course schedule	March 12 - 16, 2018
Venue	IIT Indore, Indore, India

Accommodation

Paid accommodation will be provided to participants on first-come-first-serve basis depending on availability

Contact Details

Almost all the information regarding eligibility, fee payment, travel information, accommodation, etc., are available in the course website. If you have any other queries, you may write to or call the course coordinator.

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