

ENGINEERING THERMAL ENERGY SYSTEMS, CERTIFICATE

Efficient use of thermal energy is an increasingly popular area of interest for UW–Madison engineering students and employers. The objective of the certificate in engineering thermal energy systems program is to provide students in the College of Engineering with an organized set of courses that will improve their capacity to analyze and design innovative thermal energy systems. These systems include, but are not limited to, energy conversion systems and their fuels, refrigeration, combustion, and solar energy. Thermal energy systems either employ thermal energy directly or convert thermal energy to other energy forms.

HOW TO GET IN

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Students who wish to apply for admission into this certificate program will need to complete a major/certificate declaration form obtained from the student services office. Once approved by the student services office and the student's faculty advisor, the form will be forwarded to the Dean's Office to be added to the student record. The student services office will, in conjunction with the student's advisor and curriculum committee chair, assist the student in selecting appropriate courses that fulfill certificate requirements. If a Special student does not have a home department in the College of Engineering, the Department of Mechanical Engineering will advise and sponsor the student in this program. To receive the certificate, the applicant must achieve a GPA of 3.0 or higher in the proposed courses listed on the completed form.

Submit the completed Declaration of Intent Form (<https://go.wisc.edu/u9x8g2/>) to student services.

REQUIREMENTS

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The certificate, geared toward UW–Madison undergraduate students, requires a total of 18 completed credits. Up to 9 of the credits can be thermal-energy-related courses that are required in the student's undergraduate major. The additional 9 credits must be selected from an assortment of approved elective courses in the College of Engineering.

COURSES

Courses not on this list must be specifically approved by the certificate curriculum committee.

Code	Title	Credits
Mechanical Engineering		
M E 460	Applied Thermal / Structural Finite Element Analysis	3
M E 461	Thermal Systems Modeling	3
M E 466		3
M E 469	Internal Combustion Engines	3
M E 471	Gas Turbine and Jet Propulsion	3

M E/N E 520	Two-Phase Flow and Heat Transfer	3
M E 561	Intermediate Thermodynamics	3
M E 563	Intermediate Fluid Dynamics	3
M E 564	Heat Transfer	3
M E/N E 565	Power Plant Technology	3
M E/E P 566	Cryogenics	3
M E/CBE 567	Solar Energy Technology	3
M E 569	Applied Combustion	3
M E 572	Intermediate Gas Dynamics	3
M E 573	Computational Fluid Dynamics	3

Chemical and Biological Engineering

CBE 320	Introductory Transport Phenomena	4
CBE 430	Chemical Kinetics and Reactor Design	3
CBE 440	Chemical Engineering Materials	3
CBE/M E 567	Solar Energy Technology	3
CBE 535	Heterogeneous Catalysis: Principles and Applications	3

Civil and Environmental Engineering

CIV ENGR 423	Air Pollution Effects, Measurement and Control	3
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Engineering Mechanics and Astronautics

E M A 521	Aerodynamics	3
E M A 522	Aerodynamics Lab	3
E M A 524	Rocket Propulsion	3

Nuclear Engineering

N E 411	Nuclear Reactor Engineering	3
N E/M E 520	Two-Phase Flow and Heat Transfer	3
N E 550	Advanced Nuclear Power Engineering	3
N E/M E 565	Power Plant Technology	3
E P/M E 566	Cryogenics	3

Biological Systems Engineering

BSE 460	Biorefining: Energy and Products from Renewable Resources	3
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Materials Science and Engineering

M S & E 463	Materials for Elevated Temperature Service	3
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CERTIFICATE COMPLETION REQUIREMENT

This undergraduate certificate must be completed concurrently with the student's undergraduate degree. Students cannot delay degree completion to complete the certificate.

LEARNING OUTCOMES

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1. Follow a directed sequence of technical elective courses specializing in thermal energy systems.
2. Synthesize knowledge gained from a curriculum that focuses on applying fundamentals of engineering to the analysis of thermal energy systems.

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3. Be prepared for the job market with a solid background in the energy field.