Proposal for a Graduate Certificate in Applied Heat Transfer

Submitted

by the

School of Mechanical Engineering
West Lafayette Campus
Purdue University

A Graduate Certificate Program in
Applied Heat Transfer
Awarded by
The Graduate School
And
School of Mechanical Engineering

Initiation Date: August 2002 (Requested)

Approved By:

[Signature]
E. Dan Hirshman, William E. & Florence E. Perry Head
School of Mechanical Engineering

[Signature]
Linda Katehi, John A. Edwardson Dean of Engineering
Schools of Engineering

3/28/02  Date

4/2/02  Date
This Applied Heat Transfer Graduate Certificate program is designed to meet the thermal engineering needs of the practitioner in industry. Starting from a sound treatment of the underlying fundamentals and improved analytical skills in a required course in heat transfer, this Graduate Certificate offers the student a choice from an array of courses, including fluid mechanics, numerical methods, acoustics and vibrations. In this way, the program of study can be tailored to meet individual needs in different application areas. It can be completed over a short period of time, and offers significant flexibility in course offerings. It has grown out of requests from industry, and reflects responsiveness to many of today’s thermal engineering needs. Specifically, the engineer in industry would:

- Enhance his/her understanding of applied heat transfer processes and technologies and their applications in industry;
- Strengthen his/her analytical skills and the ability to handle complex interdisciplinary problems;
- Be equipped with tools that will improve his/her ability to solve realistic multi-mode problems, with a comprehensive approach.

Outline of Information

Purpose of the Program
Target Audience
Relation to Existing Certificate Programs
Frequently Asked Questions
Completion Requirements
Admission Requirements
Course Curriculum
Administration of the Graduate Certificate
Notice of Interest, Application for Admission

Purpose of the Program

This Certificate program, sponsored by the School of Mechanical Engineering in cooperation with the Continuing Engineering Education at Purdue University is designed to help the
engineer in industry and research and development organizations become knowledgeable about the area of heat transfer as applied to the solution of industrial problems. Focus is on industrial problems related to a range of industries including electronics and computers, telecommunications and avionics, and space conditioning. The awarded Graduate Certificate will serve as evidence that the student has achieved a significant level of expertise in applied heat transfer. When fully implemented, it is expected that there will be approximately fifteen to twenty students enrolled in the graduate certificate program, with nearly half of them enrolling concurrently or subsequently for a graduate degree at Purdue.

Target Audience

This Graduate Certificate program meets the needs of

- mid-career and late-career engineers
- engineers new to the area of applied heat transfer
- engineering managers who need a background in applied heat transfer and its implementation in emerging technologies

Since the graduate certificate is intended to upgrade analytical and application skills of engineers in industry, it is not available to degree-seeking students enrolled in the Mechanical Engineering Graduate Program at Purdue.

Relation to Existing Certificate Programs

Currently, there is no certificate program in “Applied Heat Transfer” available through Purdue University. It is anticipated that other Graduate Certificates focused on the needs of engineers in various industries will be developed in the future by other disciplines in engineering and sciences. The core courses of the proposed graduate certificate on applied heat transfer include Intermediate Heat Transfer, Intermediate Fluid Mechanics, Thermal Stress Analysis, and Numerical Methods in Heat and Mass Transfer. One or more of these courses may also serve as foundation to graduate certificates in other interdisciplinary fields such as process and product design, manufacturing and material processing, thermal systems design, and propulsion.

Frequently asked Questions about the Graduate Certificate

- How to apply for the Graduate Certificate?

The student must complete the Purdue University Graduate School application form for studies at West Lafayette (Main Campus). In the enrollment objectives, the student must state “Certificate Program”. In the item on specification of subject area, the student needs to indicate “Graduate Certificate in Applied Heat Transfer”. The Mechanical Engineering Graduate Office will process the application for admission into the Certificate Program. A “worksheet” (like the one attached) will be created and made available (mailed) to the student. The student can use the worksheet to keep track of the courses he/she takes and the grades earned in each.
The student can also obtain information about the Graduate Certificate by completing the attached “Notice of Interest”. When CEE receives the notice of interest, the student will be sent up-to-date descriptions of the requirements, contact information for the ME graduate administrator who can answer questions about requirements or content, and the CEE Graduate Advanced Planning Schedule for Off-Campus Students. CEE will send a copy of the student’s notice to the ME graduate administrator while indicating the need to apply to the Purdue University Graduate School.

- How long is the student allowed to take to complete the Certificate?

All courses must be taken within a four-year time span. Students set their own pace for completion. However, it should be noted that the courses included in the Graduate Certificate are not available every semester (either through live television broadcast or via other distance education media including videotapes and videostreaming). Thus, the student will need to refer to the CEE Graduate Advanced Planning Schedule for Off-Campus Students to determine when the courses will be offered. The first and last classes the student takes for the Graduate Certificate define the four-year time frame.

- Do courses taken at Purdue University before the student enrolls in the Graduate Certificate program apply?

Yes, if they are applicable to the Graduate Certificate at the time the student registers for the program, and if they fall within the four-year time limit.

- If a student already has a Master’s or PhD from another school or in another field from Purdue University, can he/she still earn a Purdue Graduate Certificate in Applied Heat Transfer?

Yes.

- How can the student receive credit for a course taken elsewhere that he/she wishes to transfer to the Graduate Certificate program?

To obtain a letter of approval to transfer credit for a course taken elsewhere, the student needs to send the ME Graduate Office a request together with the catalog description, course syllabus, and an official transcript. The student must have earned a grade of B or better in the course for the course to be transferable. The student must clearly indicate towards which of the Graduate Certificate requirements (required or elective, as specified below) the course is to be applied. Only one three-credit course can be transferred.

- How does the student receive the Certificate?

In the semester the student is registered for the last class applicable towards the certificate, the student will send the ME Graduate Administrator the completed worksheet. At the end of the applicable semester, and within one week of the official
availability of the course grade, the Graduate Chair of Mechanical Engineering will check for the completion of the certificate requirements. If the student has successfully completed the program requirements, the Graduate Chair will notify the Graduate School, who in turn will notify the Office of the Registrar. The Office of the Registrar will generate the Certificate for the student and forward it to the permanent address of the student.

- How will the Certificate be recorded?

“GRADUATE CERTIFICATE
FIELD OF STUDY: Mechanical Engineering
SPECIALIZATION: Applied Heat Transfer”

- Can the student earn both, a Certificate and an MSE, MS, or MSME degree from Purdue?

Yes. Courses can be counted both for the Certificate and for a Master’s degree. However, students already enrolled in the Master’s degree program in Mechanical Engineering from Purdue are not eligible to apply for the certificate. Note that, to be a graduate student in a degree-seeking Master’s program, the student must complete a separate application form and be admitted to the MS, MSE or MSME program by the Purdue University Graduate School.

- Other questions?

Call the Mechanical Engineering Graduate Administrator at (765) 494-5729, or the Graduate Coordinator of CEE at (765) 494-7015.

**Completion Requirements**

- 12 credits in heat transfer and related courses (i.e., other related aspects of mechanical engineering). Up to three semester credits can be transferred from another university (effectively, one of four courses); the remainder must be earned at Purdue.

- An average grade of B or higher in the two core courses and an average of B or higher overall are required. If the student receives a lower grade in a course, he/she may repeat it once, or, for elective courses only, substitute another approved elective. This repetition or replacement will be allowed only for a maximum of two courses.

- Note: 12 credit hours earned in non-degree status (while enrolled in the Graduate Certificate) at Purdue University may be applied towards a graduate degree.
Admission Requirements

- The applicant must have a Bachelor’s degree in an appropriate area (Engineering, Science, Mathematics, Technology) with a Graduation Index (or GPA) of 3.0 or higher from an accredited institution in USA, or a duly recognized foreign institution. The student must also arrange for at least one ‘letter of reference’ to be sent directly to the Graduate Office of the School of Mechanical Engineering. For International students whose native language is not English, a minimum TOEFL score of 550 is also required. Alternate criteria may be applied to applicants who have been in the US for at least two years.

- Note: Acceptance into the Certificate program does NOT assure admission to the Graduate School of Purdue University to pursue an advanced degree.

Course Curriculum

All courses carry three semester credit hours and are taught by the graduate faculty of Purdue University.

Required

- ME 505: Intermediate Heat Transfer

And one course from the following

- ME 597G: Heat Transfer in Electronic Systems
- ME 509: Intermediate Fluid Mechanics
- ME 582: Thermal Stress Analysis
- ME 608: Numerical Methods in Heat and Mass Transfer

Electives

(must choose two, with at most one math course)

- ME 500: Thermodynamics
- ME 506: Two-Phase Flow and Heat Transfer
- ME 507: Laser Processing
- ME 509: Intermediate Fluid Mechanics
- ME 510: Gas Dynamics
- ME 513: Engineering Acoustics
- ME 518: Analysis of Thermal Systems
- ME 525: Combustion
- ME 563: Mechanical Vibrations
• ME 581: Numerical Methods in Mechanical Engineering
• ME 582: Thermal Stress Analysis
• ME 597G: Heat Transfer in Electronic Systems
• ME 605: Convection of Heat and Mass*¶
• ME 608: Numerical Methods in Heat and Mass Transfer*
• ME 614: Computational Fluid Dynamics*
• MA 527: Advanced Mathematics for Engineers and Physicists I
• MA 528: Advanced Mathematics for Engineers and Physicists II

* Either ME 608 or ME 614 can be applied to the Certificate, but not both.
¶ These electives are currently only available on the West Lafayette Campus.

**Administration of the Graduate Certificate**

The Graduate Chair of the School of Mechanical Engineering will be responsible for administering the graduate certificate program for the School. When the application submitted by the student via the Purdue University Graduate School is received, a folder will be created for the student. Within one week of being complete (with the BS transcript and one reference letter), the folder will be reviewed. The recommendation for admission will be communicated to the Graduate School and the applicant will also be advised of the action. Along with this advice, the student will be sent the “worksheet” (attached with this document). The progress of the student through the graduate certificate will be tracked using the “worksheet”, one copy of which will be made available to the student, and one copy placed in the student’s folder.

In the semester the student is registered for the last class applicable towards the certificate, the student will send the ME Graduate Administrator the completed worksheet. The address is:

ME Graduate Administrator
School of Mechanical Engineering
1288 Mechanical Engineering Building, Room ME 112
Purdue University
West Lafayette, IN 47907-1288

At the end of the applicable semester, and within one week of the official availability of the course grade, the Graduate Chair of Mechanical Engineering will check for the completion of the certificate requirements. If the student has successfully completed the program requirements, the Graduate Chair will notify the Graduate School, who in turn will notify the Office of the Registrar. The Office of the Registrar will generate the Certificate for the student and forward it to the permanent address of the student.
Notice of Interest

Graduate Certificate Program in Applied Heat Transfer

I am interested in receiving the information packet for the Graduate Certificate Program in Applied Heat Transfer.

Name  
Address  
City  
State  
Zip  
Phone (Home)  
Phone (Work)  
Email  
Fax  

Undergraduate Degree (title, date awarded, institution, and GPA)  

Signature  

Date  

Note: Certificate requirements may change over time. Requirements applicable are those in-effect in the semester in which the student is admitted into the certificate program through application to Purdue University Graduate School. Also, this is not an application. The application is available on the website of Purdue University Graduate School. The student needs to fill the Graduate School application form for admission into the graduate certificate.

Complete and return this form to:

Continuing Engineering Education  
Purdue University  
1312 Potter Engineering Building, Rm. 364  
West Lafayette, IN 47907-1312

Office Use Only

Reply Date:  

ME Date:
Name (as it should appear on certificate):

Address:

City, State, Zip:

Telephone: (Home) _____________ (Work) _____________

Student ID Number:

Completed Courses for the certificate program:

<table>
<thead>
<tr>
<th>Required</th>
<th>Date Completed</th>
<th>Grade</th>
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<tbody>
<tr>
<td>ME 505: Intermediate Heat Transfer</td>
<td></td>
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Electives

| ME 500: Thermodynamics |                |       |
| ME 506: Two-Phase Flow and Heat Transfer |                |       |
| ME 507: Laser Processing |                |       |
| ME 509: Intermediate Fluid Mechanics |                |       |
| ME 510: Gas Dynamics |                |       |
| ME 513: Engineering Acoustics |                |       |
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| ME 614: Computational Fluid Dynamics |                |       |
| MA 527: Advanced Math for Engineers and Physicists I |                |       |
| MA 528: Advanced Math for Engineers and Physicists II |                |       |