
PSEN 326

Heat Transfer Operations

Overview

As engineers, you will be concerned with heat transfer often during your career. Your objective in this class is to learn the basic concepts and theory of heat transfer and applications to typical pulp and paper processes. At the end of this course you will be expected to design systems and identify and solve engineering problems related to the transfer of energy in the form of heat. We will design and analyze the performance of a heat exchange device.

3 Credit Hours. 2 Hrs lecture, 1 Hr lab or discussion per week.

Prerequisite: PSEN 215 and 320; or consult instructor.

Goals

Apply math and science skills to heat transfer.

Design heat transfer systems.

Identify and solve engineering problems related to heat transfer.

Course Topics

1. Basic concepts of heat transfer.
2. Steady-state conduction.
3. Unsteady-state conduction.
4. Principle of convection.
5. Forced convection
6. Natural convection.
7. Heat transfer with phase change (optional).
8. Heat exchangers and applications.

ABET Student Outcomes

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. an ability to communicate effectively with a range of audiences
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

Spring 2019

[M W F: 1:00pm- 1:50pm]

Instructor: Dr. Roland Gong

E-Mail: roland.gong@uwsp.edu

Phone: 715-346-2570

Office: D276, Science Building

Office Hours: M R (11 am - 12 pm).

Materials

- J.P. Holman (2012). "Heat Transfer," 10th edition. McGraw Hill (textbook, rental)
- Flowserve, Cameron Hydraulic Data, any edition (reference).
- Not all of chapters are covered.

Classroom

D279, Science building.

Spring Break

March 18th-22nd

TAPPI PaperCon

May 5th-8th

Exams

Midterm I: 6th week

Midterm II: 11th week

Final: May 13rd (10:15pm - 12:15pm)

8. Knowledge of the science and technology used in the paper industry.

Computer and Calculator

Students must have the ability to use a spreadsheet (MS Excel) and a modern scientific calculator.

Classroom policy

Electronics, such as smart phone, tablet and laptop, are prohibited in the classroom and lab.

Students are not allowed to work on other course assignments during lectures and labs.

Homeworks

Students will have approximately 2-4 problems per homework or quiz, given bi-weekly.

Students are encouraged to consult with classmates and others (including the instructor) for problem solving. However, simply copying another student's solution to a problem is forbidden.

The solution should follow an engineering style (provided). Students who fail to follow the instruction will lose certain points. No credit will be given for a problem which fails to show the required steps to provide the correct answer.

Students have one week to complete the assignment and submit a hard copy (except specific requirements).

No credit will be given for problem sets handed in after the due date unless arranged in advance.

Plagiarism on home work and report is forbidden. Students will be reported immediately to the Office of the Dean of Students and department. No grade will be given to each part.

Project

One course project will be assigned. Project will be initiated in the middle of semester, and is completed by a group.

The team will submit a report at the end of the semester (the rubric is given below).

Laboratory report evaluation

Performance Criteria	Exceptional	Acceptable	Marginal	Unacceptable
English skills	Excellent, well written report	Good use of grammar	Generally okay, some lapses in grammar	Poor use of the English language
Organization	Very good organization, report is easy to follow	Good, logical organization	Generally okay, some careless errors	Sloppy, lack of attention to details
Report format	Few instances of noncompliance with required format	Good use of the required format	Generally okay, some lapses in format	Report did not comply with format
Scholarship	Well researched report, used many sources to support discussion effectively, complete coverage of topic	Good use of reference material to support discussion, some parts left out of topic	Minimal use of reference material, inadequate coverage of topic	No use of reference material evident, topic not addressed
Technical competence	Very good, solid understanding of processes, good use of appropriate technical vocabulary in explanations	Good understanding of processes, use of some technical language in explanations	Adequate understanding of processes, use of low level vocabulary in explanations	Poor basic understanding of processes

Exam

3 exams (1 to 2 hour) will be given during the semester. Exams are open book and open notes. Each exam will contain problems from recently covered material. Each exam will contain one slightly modified problem from the homework assignments. Where necessary, these exams will be written as take home exams to permit the use of appropriate software.

Unless arranged in advance, students must take the exam on the assigned day or no credit will be given.

No credit will be given on an exam where a student seeks help from another student. Any observed cheating will be handled following university guidelines.

Evaluation

Grades will be assigned based on a percentage of total points earned in the semester in each.

Exams: 50% (15% on each midterm, and comprehensive final exam 20%).

Homework and Quiz: 40%.

Project: 10% (team work).

Extra credits may be available in the forms of unannounced quizzes, extra practice problem or report.

Letter grades will be assigned based on the student's overall score, following the university guideline.

A (4.0, 93%), A- (3.67, 90%), B+ (3.33, 87%), B (3.00, 83%), B- (2.37, 80%),

C+ (2.33, 77%), C (2.00, 73%), C- (1.67, 70%), D+ (1.33, 67%), D (1, 60%), F (0.00, < 60%).

The instructor reserves the right to adjust the final grade according to overall performance and attendance.

Attendance

Attendance to all of lectures is highly recommended. Attendance to lab and field trip is mandatory. Student has responsibility to catch up with teaching schedule and contents. Missing class is not an acceptable excuse if a student misses the deadline of homework and lab report.

Policy on Cheating and Misconduct in Class

Any incident of cheating and/or misconduct in the classroom that threatens the continuance of a teaching and learning environment in the classroom will be handled through the University's Disciplinary Standards and Procedures. For the most accurate information regarding these standards and procedures please refer to the web site: <http://www.uwsp.edu/dos/Pages/Academic-Misconduct.aspx>. In particular, consult UWSP Chapter 14 (Academic Misconduct) and UWSP Chapter 18 (Conduct on University Lands).

Engineers must behave ethically; the safety of the public depends on not only on the competence, but also on the honesty and integrity of engineering professionals. Engineers may, at times, come under strong pressures to commit unethical acts, and the results can be tragic. At a university, one important ethical requirement is that the work upon which you are graded be your own, and not someone else's. Though group work and collaboration on homework exercises is strongly encouraged, students are cautioned against any type of unethical conduct, including copying during exams, presentation of false documentation for medical excuses, or use of stand-ins on exams and quizzes. Storage of factual information on handheld calculators, for use in closed-book exams, is also expressly forbidden.

American with Disabilities Act (ADA)

UWSP has specific policies for students with disability. If you have a disability, please inform the instructor or department.