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# PSEN 445

## Paper Coating and Converting Operations

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### Overview

Paper coating and converting are important in paper manufacturing. Paper coating refers to pigment coatings, which improve paper surface conditions for appealing, printing, and other desired functions. Students study the basics of paper coating, raw materials, coating variance and process, and calendering. Coating formulations, principle and rheology are included. Paper converting includes printing methods, corrugated paperboard and container, tissue. In addition, functional coating and laminations will be offered on demand.

3 Credit Hours. 3 Hrs lecture, lab, or field trip.

Prerequisite: PSEN 115 or consult instructor.

### Goals

Demonstrate knowledge of paper coating processes.

Design and practice simple paper coating formulations.

Demonstrate knowledge of paper converting processes.

Identify major paper products and corresponding manufacturing.

Participate in field trips and observe the operations of paper mills and converting plants.

### Course Topics

1. Raw material of paper pigment coatings
2. Coating rheology, coaters and coating processes.
3. Coating formulations.
4. Functional coatings and laminations (optional).
5. Printing and color theory.
6. Corrugated paperboard and containers
7. Tissue manufacturing
8. Other paper convertings (optional)

### 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

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Spring 2019

[R: 2:00am - 04:50pm]

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Phone: 715-346-2570

Office: D276, Science Building

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

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### Materials

- J. C. Walter (1993). "The Coating Processes," McGraw Hill (textbook, rental)
- E. Lehtinen (2000). "Pigment Coating and Surface Sizing of Paper," TAPPI Press
- Garry Smook (2002). "Handbook for Pulp and Paper Technologists," 2nd or 3rd, TAPPI Press (reference).
- Other materials provided by instructor (reference).
- Not all of chapters are covered.

### Classroom

D279, Science building.

### Spring Break

March 18th-22nd

### TAPPI PaperCon

May 5th-8th

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
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.

## Labs and Field Trips

Three or four field trips are scheduled for visiting the processes of paper coating, converting, printing, corrugating and tissue making (Field trips are subjected to change).

Three or more lab exercises are scheduled, involving coating formulation design, dispersion, mixing, rheology testing, draw down, calendering, paper and paperboard products testing and analysis, printing products identification and analysis, coating and lamination trials.

Although each lab is completed by a team. Each individual need to submit a brief lab report for each lab. Lab report will be graded as following standard.

Late assignment submission is not allowed and no grade will be given.

## Laboratory report evaluation

Performance Criteria	Exceptional	Acceptable	Marginal	Unacceptable
<b>English skills</b>	Excellent, well written report	Good use of grammar	Generally okay, some lapses in grammar	Poor use of the English language
<b>Organization</b>	Very good organization, report is easy to follow	Good, logical organization	Generally okay, some careless errors	Sloppy, lack of attention to details
<b>Report format</b>	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
<b>Scholarship</b>	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
<b>Technical competence</b>	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

## Evaluation

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

Lab and field trips: 60%.

Presentation and/or quiz: 40%

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%).

I reserve the right to adjust the student grades based on the overall performance and attendecne.

## Attendance

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Attendance to all of lectures is NOT required. However, 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.