

Syllabus: PKG 4011 – Packaging Production & Processing

Credits: 3

Meeting Times: MWF 11:45-12:35 AM (Rogers 110)

Office Hours: MWF 12:35-2 PM (Or by appointment)

Instructor: Bruce A. Welt Ph.D.
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General Description: Study specification, design, acquisition, operation, performance assessment and economic justification of modern packaging lines. Processes related to product and package production are studied. Study of ethics related to production, consumption and professionalism including decision-making, labor relations, innovation, sustainability, profits, taxes, etc.

Objectives: After successful completion of this course the student will be able to:

1. Identify and research packaging machines, machine manufacturing companies and packaging industry associations (HINT: PackExpo.com).
2. Identify unit operations that comprise common packaging lines.
3. Specify operating requirements of individual packaging machines in order to allow groups of packaging machines to function as a coherent system.
4. Apply time-value-of money concepts to assist in making capital investment decisions.
5. Understand relationships between products, packages, machines, and personnel.
6. Describe roles of barcodes, machine vision and RFID in improving efficiency and traceability.
7. Critically analyze ethical arguments related to employment, production, consumption, environment and society.
8. Assess feedback process control loops and digital programmable logic controllers.
9. Contribute to the productivity of packaging operations involved in various markets including bottling, folding cartons, rigid packaging, flexible packaging, product handling and quality control/assurance.

Text: Davis, C.G. *Introduction to Packaging Machinery*. Packaging Machinery Manufacturers Institute, Arlington, VA. 1997 (draft).

Grading:

2-3 Exams	100 Points Each
Online Discussions	Average counts as exam grade
Final Exam/Project	200 Points

CLASS ATTENDANCE IS MANDATORY. All exams and homework assignments will be graded on a scale from 0 to 100. An automatic 10% per week penalty will be assessed to work turned in passed the due date. Final grades will be computed from the percentage of points earned relative to the total points possible. Grades will be assigned as follows:

A \geq 90%
87 \leq B+ < 90
83 \leq B < 87
80 \leq B- < 83
77 \leq C+ < 80
73 \leq C < 77
70 \leq C- < 73
67 \leq D+ < 70
63 \leq D < 67
60 \leq D- < 63
E < 60

Recommended Reading:

Brody, A.L. and Marsh, K.S. 1997. *The Wiley Encyclopedia of Packaging Technology*, Second Edition. John Wiley & Sons, Inc. New York, NY.

Cognex, Inc. machine vision education website (<http://www.cognex.com/education/default.asp>).

Luciano, R. 1995. *How to Write Packaging Machinery Specifications*. Institute of Packaging Professionals, Herndon, VA.

Pyzdek, T. 2001. *The Six Sigma handbook*. McGraw-Hill, NY.

Rand, A. 1957. *Atlas Shrugged*. Random House, NY.

Soroka, W. 1999. *Fundamentals of Packaging Technology*, Institute of Packaging Professionals, Herndon, VA. Tyco, Inc. – Sensormatic RFID website (<http://www.sensormatic.dk/RFID/default.asp>).

Zepf, P.J. 1996. *Improving Packaging Line Performance*. Institute of Packaging Professionals, Herndon, VA.

Course Outline:

- I. Ethics related to production, consumption, profits and labor
- II. Overview of Packaging Lines
- III. Machinery
 - a. Bottling Machinery
 - b. Folding Carton Machinery
 - c. Labeling
 - d. Case Packaging Machinery
 - e. Palletizing and depalletizing
 - f. Form-Fill-Sealing
 - g. Conveyors, accumulators and unscramblers
 - h. Coding and marking
 - i. Scales and check weighing
- IV. Plastic Package Manufacturing
 - a. Extrusion
 - b. Thermoforming
 - c. Blow molding
 - d. Injection molding
- V. Techniques for measuring line capacity and efficiency
- VI. Capital investment economics
 - a. Financial Accounting
 - b. Time value of money
 - c. Role of Depreciation policies in capital projects
 - d. Critical Path Analysis
- VII. Quality management approaches
 - a. TQM
 - b. SPC
 - c. Six-sigma
- VIII. Process control and automation
 - a. Motors and motor controllers
 - b. PLC
 - c. PID
 - d. Barcodes and scanners
 - e. Machine Vision
 - f. RFID.
- IX. Ethics Continued

Academic Honesty: As a result of completing the registration form at the University of Florida, every student has signed the following statement: "I understand the University of Florida expects its students to be honest in all their academic work. I agree to adhere to this commitment to academic honesty, and understand that my failure to comply with this commitment may result in disciplinary action, up to and including expulsion from the university."

Software Use: All faculty, staff and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Such violations are also against University policies and rules, and disciplinary action will be taken as appropriate.

University of Florida Counseling Services: Resources are available on campus for students having problems or lacking clear career and academic goals that interfere with their academic performance. These resources include:

1. University Counseling Center, 301 Peabody Hall, 392-1575, personal and career counseling.
2. Student Mental Health, Student Health Care Center, 392-1171, for personal counseling.
3. Sexual Assault Recovery Services (SARS), Student Health Care Center, 392-1161, for sexual assault counseling.
4. Career Resource Center, Reitz Union, 392-1601, career development