

ISYE 640: Advanced Production and Inventory Control

Syllabus

Term: Spring 2022

Credit hours: 3

Classroom: EB 209

Time: Thursdays 6:00pm – 8:40pm

Instructor: Dr. Ziteng Wang

- **Office:** EB 240
- **Email:** zwang3@niu.edu
- **Office hour:** Tuesdays 3:30pm – 4:30pm, or by email appointment

Teaching assistant: See Blackboard

Course description: Advanced theory and methods of inventory control systems. Underlying behavior of production systems. Modern approaches to production planning and operations management.

Prerequisites:

- ISYE 540, or consent of department.

Textbook:

- Factory Physics. 3rd edition. Wallace J. Hopp and Mark L. Spearman. Waveland Press, Inc.
<https://factoryphysics.com/factory-physics-3rd-edition>

Course objective: To provide students with advanced knowledge of production planning and inventory control and skills in analyzing and designing production systems.

Learning outcomes: Upon completion of this course, a student should be able to do the following:

- Understand basic concepts and principles of Factory Physics
- Understand variability in manufacturing systems and its influence
- Know how to assess and analyze the efficiency of a production system
- Apply Factory Physics to examine existing and new production planning and control methods

Relation to graduate program outcomes. This course contributes to the following outcomes of the graduate program:

- A. An ability to define and formulate Industrial and Systems Engineering problems.
- B. An ability to apply math and scientific tools to define, design, predict, improve, and optimize the system performance.
- C. An ability to independently learn advanced topics in Industrial and Systems Engineering.
- D. An ability to conduct research or project professionally and ethically.
- E. An ability to effectively communicate ideas/concepts and research findings through technical reports and professional presentations.

Course topics: The following topics will be covered in this course:

- Review of selected production and inventory control methods: inventory models, MRP, JIT, Lean
- Factory Physics: concepts, definitions, measures, analysis, principles
- Factory Physics principles in practice: pull planning framework and selected modules

Assignments and Grading:

- Homework: 30%
 - Homework must be completed individually.
 - No late homework will be accepted.
- Exam: 40%
 - There will be one exam.
 - Time: **Thursday 04/14 6:00pm – Friday 04/15 11:59pm**
 - Format: Take-home open-book exam.
 - Exam policies:
 - Students must complete the exams individually. Receiving help from others or giving help to others is strictly prohibited. No late work will be accepted.
 - Students must contact the instructor ahead of time if unable to take an exam within its specified time frame except for medical or other emergencies after which proper documentation will be required.
 - No make-up exams will be allowed without instructor's approval.
- Project: 30%
 - Students should form teams of no more than 3 to conduct the project.
 - The project should be a quantitative study of a production and inventory control case by applying the Factory Physics approach. For example, a project may focus on reducing the cycle time of a production line at the minimum cost. Another example is to improve the existing design of a production system to ensure better product quality. Students may use the case materials provided by the instructor or find cases from other sources.
 - Tasks and due dates:
 - Team sign-up: **Thursday 03/10 11:59pm**
 - Project proposal: **Thursday 03/10 11:59pm**
 - Project progress report: **Thursday 04/07 11:59pm**
 - Project presentation: **Thursday 05/05 (in class)**
 - Project final report: **Thursday 05/12 11:59pm**
 - Additional requirements and guidelines will be posted on Blackboard.
- Each student will receive a letter grade based on his or her cumulative percentage score according to the following scales:
 - A 94 – 100
 - A- 88 – 93.99
 - B+ 82 – 87.99
 - B 76 – 81.99
 - B- 70 – 75.99
 - C+ 64 – 69.99
 - C 58 – 63.99
 - C- 52 – 57.99
 - D 46 – 51.99
 - F 0 – 45.99

Tentative course schedule:

Week	Date	Topics/Content	Module	Reading	Assignments
1	01/17 – 01/23	Course overview; Introduction to factory physics	0, 1	Ch0, 1	HW1: Manufacturing in America
2	01/24 – 01/30	Review of inventory models	2	Ch2	HW2: inventory models; HW1 due
3	01/31 – 02/06	Review of MRP and Lean;	3	Ch3, 4, 5	HW3: MRP and Lean; HW2 due
4	02/07 – 02/13	Basic factory dynamics	4	Ch6, 7	HW4: basic factory dynamics; HW3 due
5	02/14 – 02/20	Variability basics	5	Ch8	HW5: Variability; HW4 due
6	02/21 – 02/27				
7	02/28 – 03/06	Influence of variability	6	Ch9	HW6: Influence of variability; HW5 due; Project proposal due
8	03/07 – 03/13				
9	03/14 – 03/20	Spring Recess			
10	03/21 – 03/27	Push and pull production systems; Total quality manufacturing	7	Ch10, 11, 12	HW7: push and pull systems; HW6 due;
11	03/28 – 04/03	A pull planning framework; Shop floor control	8	Ch13, 14	HW8: pull planning HW7 due;
12	04/04 – 04/10	Production scheduling	9	Ch15	HW9: production scheduling; HW8 due; Project progress report due
13	04/11 – 04/17	Exam			
14	04/18 – 04/24	Aggregate and workforce planning	10	Ch16	HW10: aggregate planning; HW9 due;
15	04/25 – 05/01	Synthesis and wrap-up		Ch17, 18, 19	HW10 due

16	05/02 – 05/08	Project presentation			
17	05/09 – 05/15	Exam week			Project final report due

Academic integrity: Good academic work must be based on honesty. The attempt of any student to present as his or her own work that which he or she has not produced is regarded by the faculty and administration as a serious offense. Students are considered to have cheated if they copy the work of another during an examination or turn in a paper or an assignment written, in whole or in part, by someone else. Students are guilty of plagiarism, intentional or not, if they copy material from books, magazines, or other sources without identifying and acknowledging those sources or if they paraphrase ideas from such sources without acknowledging them. Students guilty of, or assisting others in, either cheating or plagiarism on an assignment, quiz, or examination may receive a grade of F for the course involved and may be suspended or dismissed from the university.

Each student is responsible to know and observe the university academic regulations that can be found in the Graduate Catalog.

Accommodations for students with disabilities: If you need an accommodation for this class, please contact the Disability Resource Center as soon as possible. The DRC coordinates accommodations for students with disabilities. It is located on the 4th floor of the Health Services Building, and can be reached at 815-753-1303 (V) or drc@niu.edu.

Also, please contact me privately as soon as possible so we can discuss your accommodations. The sooner you let us know your needs, the sooner we can assist you in achieving your learning goals in this course.

Syllabus change policy: Every attempt is made to provide an accurate overview of the course and its requirements. However, certain circumstances may make it necessary for the instructor to modify the syllabus during the semester for the benefit of the students and the changes may depend, in part, on course progress and students' needs. Changes to the syllabus will be made with advance notice to students and approval by the department.