ISYE 3104 SUPPLY CHAIN MODEL: MANUFACTURING & WAREHOUSING

Prepared by Prof. Keskinocak, Fall 2018

Credit: 3-0-3

Prerequisite(s): ISYE 2028 Statistics and ISYE 3232 Stochastic Process, Co-requisite ISyE 3133 Engineering Optimization

Catalog Description
Design and operation of manufacturing, service and warehousing facilities.

Text
Notes

References
1. Steven Nahmias *Production and Operations Analysis*, 5th edition, Irwin, 2005 (supported by additional references wherever necessary, typically provided to the students through the "Reserves" system of the campus library).
2. Factory Physics, 3rd Edition, by Wallace J. Hopp, Mark L. Spearman.

Objectives

The objectives of this course are to understand the process of work flow from demand to products or services, the parameters and decisions that impact the performance of the processes, a few basic models, and some tools that can be used in the design and operation of the processes.

Topical Outline

Topics	Weeks
Introduction to the process of work flow from demand to products to services.	1
The parameters and performance measures: cycle time, throughput, work-in-process.	1
The use of capacity, buffer, push/pull and pooling in system design	2
Summary	1
Material requirement planning, JIT and Manufacturing Resource planning	2.5
Machine scheduling	1.5
Summary	1
Facilities layout: adding the special dimention	1
Warehousing system as a work flow system	1
Slotting	0.5
Order picking and system design	1
Emerging issues: Global operations, ethics and the environment.	1
Summary	0.5
	15

Outcomes

At the end of this course, the students will be able to:

1. describe the factors and performance measures that affect the work flows in manufacturing, service, and distribution centers;
2. apply mathematical models to coordinate the deployment and allocation of resources such as labor, inventory, space, equipment and capital, towards the satisfaction of the demand and any additionally posed constraints;
3. use optimization, database and productivity software tools in solving practical operational problems;
4. work in teams in a team project;
5. appreciate the significance of issues such as ethics and sustainability, which currently emerge in the operations of the aforementioned systems;
6. use reference resources to find models and methods not covered in the class.

Course outcome \ Program Outcomes	**1. identify, formulate solve engg prob by engg, sci & Math**	**2. produce solutions consider public health, safety, welfare, global, cultural, social, environ & economic**	**3 communicate with a range of audience**	**4 recognize ethical & professional responsibilities, make informed judgement consider resolutions in global, economic, environ and societal context.**	**5. effective on a team provide leadership, collaborative and inclusive envirn, plan tasks & meet objectives**	**6. develop and conduct experiment, analyze and interpret data & use engineering judgement to draw conclusions.**	**7. acquire and apply new knowledge using appropriate learning strategies**
1. Describe factors and performance measures of work flow	M						
2. Model to allocate resources	H	H					
3. Software						M	
4. Work in teams			L		H		
5. Ethics and sustainability				M			
6. References							M

Evaluation of the important outcomes

The following course outcomes will be assessed through the course exams and project

2. Direct questions on final exam or project
4. Work in teams effectively via project

The approximate relationship from prior ABET a – k to new ABET 1 – 7.

OLD Criterion 3. Student Outcomes The program must have documented student outcomes that prepare graduates to attain the program educational objectives. Student outcomes are outcomes (a) through (k) plus any additional outcomes that may be articulated by the program.	NEW Criterion 3: Student Outcomes The program must have documented student outcomes that support the program educational objectives. Attainment of these outcomes prepares graduates to enter the professional practice of engineering. Student outcomes are outcomes (1) through (7), plus any additional outcomes that may be articulated by the program.
(a) an ability to apply knowledge of mathematics, science, & engineering (e) an ability to identify, formulate, and solve engineering problems	(1) An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	(6) An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health & safety, manufacturable, & sustainable	(2) An ability to apply engineering design to produce solutions that meet specified needs with consideration for public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
(d) an ability to function on multidisciplinary teams	(5) An ability to function effectively on a team whose members together provide leadership, create a collaborative & inclusive environment, establish goals, plan tasks, and meet objectives.
(f) an understanding of professional and ethical responsibility (h) the broad education necessary to understand the impact of engg solutions in a global, economic, environmental, & societal context (j) a knowledge of contemporary issues	(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.
(g) An ability to communicate effectively.	(3) An ability to communicate effectively with a range of audiences.
(i) a recognition of the need for, and an ability to engage in life-long learning	(7) An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	Implied in 1, 2 and 6