

ISYE 4301 Supply Chain Economics

Required for Economics and Financial systems concentration depth

Credit: 3-0-3

Prepared Profs. Zhou and Ziani, 2021

Prerequisite(s): ISyE 3133, ISyE 3232

Catalog Description:

The course studies techniques for coordination and collaboration in supply chains. Applications include pricing strategies, revenue management, gaming, and incentives.

Course Description

The supply chain starts from raw materials in nature and ends at consumption as products or services through a complex network of collaborative and competitive production and service providers. In the circular economy, the reverse chain starts from the end of consumption. It involves reuse, repurpose, recycle, or landfills. This course is about the strategies for firms to collaborate with their partners and compete in their markets using models in supply chain and economics. It involves qualitative discussions and quantitative models on incentives, pricing, supply quantity planning, differentiation, games, information, scale, share, and speed. The unique feature of this course is it considers human centered design and sustainability as a major objective in Industry 5.0.

References:

Chen Zhou, "Supply Chain with Economics and Human Needs," Barnes & Noble, May 2022. You can also get the PDF version for free at Chen Zhou's website:

<https://sites.gatech.edu/chen-zhou/>.

Topical Outline

This course will discuss the qualitative and quantitative issues in

Topic	Weeks
Collaborations and Principal-Agent models	2.5
Competition: Cournot, Bertrand, extensions	2.5
Differentiation	1
Pricing, auction, pricing discriminations	1
Supply chain and logistics: transportation and storage	1
Economies of scale, batching	2
Economies of scope, sharing	1
Uncertainty, its cost and mitigation	2
Incentive contracts and summary	1
Total	14

Course Learning Outcomes and their relationships to Program Outcomes

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

1. Understand the supply chain, and economic forces in the circular economy and UN SDGs.
2. Understand information asymmetry, principal-agent model in collaboration.
3. Apply game theory-based models in competitions.
4. Quantify the economic forces in the supply chain, such as scale, scope, sharing, uniformity, and speed.
5. Develop plausible solutions and present results in team projects.
6. Consider ethical and professional responsibilities and Environmental, Societal and Governance.

Course outcome \ Program Outcomes	1. identify, formulate solve engg prob by engg, sci &	2. produce solutions consider public health, safety, welfare, global, cultural, social,	3 communicate with a range of audience	4 recognize ethical & professional responsibilities, make informed judgement consider resolutions in global, economic, environ and	5. effective on a team provide leadership, collaborative and inclusive envirm, plan tasks & meet objectives	6. develop and conduct experiment, analyze and interpret data & use engineering judgement to	7. acquire and apply new knowledge using appropriate learning strategies
1. Understand SC, economic forces and circular economy and UN SDGs							
2. Understand information asymmetry, P-A model and collaboration.	M						
3. Apply game theories in collaboration and competition.	M						
4. Quantify the economies forces	M		M				
5. Develop plausible solutions and present results in team project		H			H		M
6. Consider ethical and professional responsibilities.				H			

Evaluation of the important course outcomes

The course outcomes 5 and 6 assessed by project and final exam questions.