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Birla Institute of Technology & Science, Pilani
Hyderabad Campus

ACADEMIC – GRADUATE STUDIES AND RESEARCH DIVISION
SECOND SEMESTER 2022-2023
Course Handout (Part -II)

16-01-2023

In addition to part I (General Handout for all courses appended to the time table) this portion gives further specific details regarding the course.

Course No.: CE G575

Course Title: Freight Transportation

Instructor-in-charge: Prasanta Sahu (prasanta.sahu@hyderabad.bits-pilani.ac.in)
Office: D-327

Course Description: Introduction to Freight System, Overview of three-layer structure of freight: Global, Regional and Local, Freight Transport Industry Structure: Maritime freight Transport, Air freight Transport, Road freight Transport, Rail Freight Transport. Factors affecting freight demand, Freight generation, Freight trip generation, Modelling Inter-Regional Freight Demand Models. Use of GPS and Bluetooth Data for Freight Analysis, International best practices of freight models. Freight Distribution Structures, Logistics Network Planning, Distribution centers, urban freight consolidation centers and warehouses: location, design and operation, Warehouse management and information, Material Management and Inventory Theory, Economic Order Quantity, Demand forecasting for inventory replenishment systems. Off-hour freight delivery (OHD) schemes, Freight emission modelling, Humanitarian Logistics. Relief Network Models for Efficient Disaster Management.

1. Scope and objectives of the course:

Scope: The freight transport system is essential for the effectiveness and efficiency of the overall logistics system in a company. When studying freight transport systems, it is crucial to understand the demand for the services as well as properties of freight transport systems and their components used in supplying the transport services, as well as the influence of policy decisions. The perspectives of transport operators, their customers and the society are taken in this course and the focus is mostly on European conditions.

Course Outcome: At the end of this course, the students are expected to develop ability to:

1. Define technical terms and explain basic technical and operational concepts
2. Characterize the traffic modes road, rail, sea, air and pipelines as well as combinations of them
3. Combine technical components and operational concepts into freight transport systems
4. Choose and illustrate an appropriate transport service for a specific transport demand
5. Review the trends and challenges for the freight transport industry
6. Match quantitative tools with specific problems
7. Solve simple route planning and transport allocation problems quantitatively

Student Learning Outcomes (SLOs) assessed in this course – **(a), (b), (c), (e), (h), (i), (j),** and **(k).**

2. Textbook(s):

Text Book (TB)

- **T1:** Tavasszy, L., and DeJong, G. Modeling Freight Transport, Elsevier 1st Edition 2014
- **T2**: Sunil Chopra, Peter Meindl and D V Kalra, "Supply Chain Management: Strategy, planning and Operation", Pearson Education, Sixth Edition, India, 2016.

Reference Books (RB)

- **R1:** De Dios Ortuzar, J., and Willumsen, L. G. Modelling transport. John Wiley & Sons., 2011
- **R2:** Donald J. Bowersox, David J. Closs, and M. Bixby Cooper "Supply Chain Logistics Management", Second Edition, Tata McGraw-Hill.
- **R3:** Sarkar, P.K., Maitri, V., and Joshi, G.J. Transportation Planning, Principles, Practices and Policies, PHI Pvt. Ltd., 2016

Lecture wise Course Plan

Lecture No.	Topics Covered	Learning objectives	Reference to TB, RB	SLO*
1	Economic Activity and Freight Transport System	To study the concepts of system components of Freight transportation	***T1:Ch.1; T2:Ch.7; R1: Ch.1; R2: Ch. 1; R3: Ch. 8***	**a, c**
2-3	Overview Transportation Demand Modeling	To understand the basic concepts of Travel Demand Modeling	***T1: Ch.1 ; ; T2:Ch.7; R1: Ch.1 ; R2: Ch.1 ; R3: Ch. 8 ;***	**a,c,e**
4-6	Introduction to freight transportation modelling: Aggregate and	To learn different types of transportation models	***T1: Ch.1 ; T2:Ch.7R1: Ch.1 ;***	**a,b,j**

	disaggregate models; I-O Model, Global, Regional, Local		***R2: Ch.1 ; R3: Ch. 8***	
7-9	Freight Travel Analysis Zones (FTAZ) and Freight survey design; Data collection	To be able to understand and conduct freight survey and design FTAZ	***T1: Ch.4 ; T2:Ch.7; R1: Ch.1; R2: Ch.1 ; R3: Ch.8***	**a,c,e**
10-16	Freight Trip Generation and Land Use Freight Generation and Freight Trip Generation; Trend and time series models; System dynamics models Zonal trip rate models; Model aggregation and transferability	To be able to develop various trip generation models; To be familiar with econometric model development using R-studio	***T1: Ch.3 ; R1: Ch.3 ; R2: Ch.1 ; R3: Ch.9***	**a,b,j,k**
17-23	Freight Trip Distribution Distribution of freight flows Production/Consumption to origin/destination	To learn and solve trip distribution models; To be able to calibrate the impedance factor for future trip distribution.	***T1: Ch.5 ; T2:Ch.8; R1: Ch.4 ; R2: Ch.2 ; R3: Ch.9***	**a,b,e,j,k**
24-28	Mode Choice Competing modes for specific commodity choice; Behavioural methodology; Associated factors	To understand the mathematical basis of freight travel behaviour; To estimate freight choice models using N-Logit	***T1: Ch.6 ; T2:Ch.8; R1: Ch.5; R3: Ch.9***	**a,b,e,k**
25-30	Assignment Models Assignment Algorithms for freight Typical algorithms used Data needs	To learn how to assign freight trips on a coded network. To be able to model the empty trips in the modelling system.	***T1: Ch.7,8 ; T2:Ch.8; R1: Ch. 6, 7, 8 ; R2: Ch.3 ; R3: Ch.9***	**a,b,e,k**
33-39	Supply Chain Management; Supply Chain Drivers and Metrics; Designing the distribution network; Planning demand and supply in supply chain; Planning and managing inventories in a supply chain	Identify the major drivers of supply chain performance. Discuss the role each driver plays. Describe the major obstacles that must be overcome to manage a supply chain successfully. Designing the distribution network in a supply chain, Network design in the supply chain, Network design in uncertain environment	***T1: Ch.9; T2: Ch.3,4,5 69***	**a,b,c,e.k**
40-41	Freight Transportation, and Sourcing	Sourcing decisions in a supply chain, Transportation in the supply chain, Pricing and revenue management in the supply chain	***T2: Ch. 14***	**c,e,i,j**
42	Sustainability and the supply chain	Introduction to sustainability; Issues and performance measures	***T2: Ch.17***	**a,f,h,i,j**

***Student Learning Outcomes (SLOs):**

SLOs are outcomes (a) through (k) plus any additional outcomes that may be articulated by the program.

(a) an ability to apply knowledge of mathematics, science and engineering
(b) an ability to design and conduct experiments, as well as to analyze and interpret data
(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 and safety, manufacturability, and sustainability
(d) an ability to function on multidisciplinary teams
(e) an ability to identify, formulate, and solve engineering problems
(f) an understanding of professional and ethical responsibility
(g) an ability to communicate effectively
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
(i) a recognition of the need for, and an ability to engage in life-long learning
(j) a knowledge of contemporary issues
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Evaluation Scheme

Sl. No.	Evaluation component	Duration	Weightage	Date, time	Nature of component
1.	Quiz (at least two)	40 Minutes	10%	To be announced in class	OB
2.	Assignments (at least 2)	-	15%	Continuous	OB
3.	Term Paper	-	15%	Continuous	OB
4.	Mid-semester exam	90 Minutes	25%	17/03 9.30 - 11.00AM	CB
5.	Comprehensive Exam	3 Hours	35%	17/05 FN	CB

Office Consultation Hour: To be announced in the class.

Notices: All Notices concerning to the course will be displayed on **CMS, Google Classroom and Notice Board** of Civil Engg. Department.

Make up policy: Makeup will be given only to the genuine cases with prior permission.

Academic Honesty and Integrity Policy: Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

Instructor-in-charge

CE G575