



Ministry of Higher Education and Scientific Research

Erbil Polytechnic University

Technical Engineering College/Erbil

Highway Engineering Department

Subject: Airport and Railway Engineering

Course Book for 4th Academic Year

Lecturer's name: Grdamand J. Mohammed M.Sc.

Academic Year: 2023/2024

Course Book

1. Course name	Airport and Railway Engineering
2. Lecturer in charge	Grdamand J. Mohammed
3. Department/ College	Highway Engineering Department.
4. Contact	e-mail: Grdamand.mohammed@epu.edu.iq
5. Time (in hours) per week	Theory: 4 Hours Practical: 0 Hours
6. Office hours	2 days per week (Tuesday and Tuesday) from 8:30 to 1:30
7. Course code	ARE703
8. Teacher's academic profile	BSc in civil Engineering at technical Engineering college/Erbil(2009) MSc in General civil engineering at Nottingham University-UK (2014)
9. Keywords	Railway track, Runway , Design
10. Course overview:	
Railway Engineering:	
<ul style="list-style-type: none">• This module will introduce the components of railway track structures, conventional and otherwise.• It will include analysis of forces on a railway track and consequent deflections, stresses etc.• Alignment design principles.• An overview of the railway as a total system including operational issues, signalling and control.	
Airport Engineering:	
<ul style="list-style-type: none">• This module will introduce the components of airport structures, conventional and otherwise.• It will include major restructuring to cover airport–airspace interaction, airport capacity (both airside and landside), and airside geometric design, respectively.• Methods for passenger terminal planning and pavement design.• An overview of the Structural Design of Airport Pavements.• Systems and signal control at airport	

11. Course objective:

Railway Engineering:

- ❖ To give **requisite grounding** for those considering employment in the railway industry.
- ❖ It is intended that a good understanding of **railway track structure** is achieved. By the end of the module, students **should** have:
 - Familiarity with **systems** used to control **train movements**;
 - An understanding of requirements of railway **alignment design**;
 - Gained an insight into railway **construction and maintenance** processes;
 - A basic knowledge of **rail & fastening** technologies;
 - An understanding of rail **track design and performance**;
 - Been introduced to rail track **analysis** techniques;
 - Acquaintance with **ballast less** track.

Airport Engineering:

To give **requisite grounding** for those considering employment in the **aviation industry**. It is intended that a good understanding of **airport structure** is achieved. By the end of the module, students **should** have:

- Familiarity with **systems** used to control **plane movements**;
- An understanding of requirements and standards of runway and taxiway **alignment design**;
- Ability to **structure** and **formulate problems** related to the design airport airside and landside facility and logistic processes.
- Experience in creative **problem-solving** in airport design, planning and operation.
- Ability to **communicate**, report and operate effectively.
- Awareness of regulatory requirements of international **airport design standards**.

12. Student's obligation

- a. To attend the classes regularly with minimum absence.
- b. To participate actively in the class discussion and Q&A session
- c. Study on daily basis to digest the class material
- d. To write note off-handouts
- e. Prepared for sudden Quizzes
- f. Vet through the references provided by the lecturer and to solve as much as possible of homework and exercises for the subjective materials.

g. Prepare the assignment and the seminar as instructed by the lecturer.

13. Forms of teaching

1. A handout will be given to the students
2. All lectures by PowerPoint
3. Notes and questions are explained on white board.
4. Videos will be played during the lectures.

14. Assessment scheme

1. Two exams will be held .
2. Theoretical Exam each season.
3. Quiz and activities in class.

15. Student learning outcome:

16. Course Reading List and References:

Railway Engineering:

1. Vuchic, V R “Urban Transit Operations, Planning and Economics”, New York: Wiley, 2005, 644pp.
 2. Harris, N G & Anderson, R J “An International Comparison of Urban Rail Boarding and Alighting Rates”, Jnl. Rail & Rapid Transit 221 F4 2007, pp. 521-526.
 3. Harris, N G “Train Boarding and Alighting Rates at High Passenger Loads”, Jnl. Adv. Transpn. 40 (3) 2006 pp. 249-263.
 4. Harris, N G, Graham, D J, Anderson, R J & Haojie, L “The Impact of Urban Rail Boarding and Alighting Factors”, TRB 3rd Annual Meeting, Washington DC, USA, 2014.
 5. Harris, N G, Mjosund, C S & Haugland, H “Improving Railway Performance in Norway”, Jnl. of Rail Trans. Plan. & Man. 3 2014 pp. 172-180.
 6. Weidmann, U “Der Fahrgastwechsel im öffentlichen Personenverkehr”, Schriftenreihe des IVT, Zurich, 1994, no. 99. (in German)
 7. Daamen, W & Hooghendoorn, S P “Pedestrian Traffic Flow Operations on a Platform”, Proc. COMPRAIL 2004 pp. 125-134, WITpress, Southampton, UK.
- Coxon, S, Burns, K & de Bono, A “Design Strategies for Mitigating Passenger Door Holding Behaviour on Suburban Trains in Paris”, 33rd Australasian Transport Research Forum Conference, Canberra, 29 Sep – 1 Oct 2010

Airport Engineering:

- i. **Planning and Design of Airports, Fifth Edition Authors: Robert Horonjeff and**

Francis X. Mckevey, McGraw-Hill Book Company.

- ii. **Airport Engineering Planning, Design, and Development of 21st Century Airports, Fourth Edition, Authors: Norman J. Ashford, Saleh Mumayiz, Paul H. Wright**
- iii. **Airport Engineering, Third Edition, Authors: Norman Ashford, Paul H. Wright.**

17. The Topics:	Lecturer's name
<p>Railway Engineering:</p> <ul style="list-style-type: none">➤ Introduction➤ RAILWAY CONSTRUCTION PROCESSES➤ RAILWAY MAINTENANCE PROCESSES➤ TRACKBED DETERIORATION / MEASUREMENT➤ BALLAST PROPERTIES➤ PERMANENT DEFORMATION WITHIN BALLAST➤ BALLAST FOULING➤ SUB-BALLAST AND SUBGRADE➤ INHERENT TRACK QUALITY➤ 'BEAM ON ELASTIC FOUNDATION' ANALYSIS➤ SUB-STRUCTURE STRESS ANALYSIS➤ TRAIN DYNAMICS➤ OTHER FORCES ON THE TRACK<ul style="list-style-type: none">1. Thermally Induced Forces2. Cornering Force3. Wind4. Traction and Braking5. Wheel Flats➤ WHEEL / RAIL CONTACT➤ WHEEL / RAIL CONTACT<ul style="list-style-type: none">1. Rails2. Contacts Stresses3. Heat generated by braking➤ RAIL FRACTURE<ul style="list-style-type: none">1. Fracture mechanics2. Cracking Mechanism in Rails3. Crack Detection➤ FASTENING SYSTEMS➤ SLEEPERS➤ SWITCHES & CROSSINGS	Grdamand Mohammed Weekly

<ul style="list-style-type: none"> ➤ ALTERNATIVE TRACK FORMS ➤ LIGHT RAPID TRANSIT <ul style="list-style-type: none"> 1. On-street Track 2. Other Features 3. The Battle for Road Space ➤ ALIGNMENT <ul style="list-style-type: none"> 1. General 2. Curves 2. Cant Design 4. Transition Curves ➤ SIGNALLING & CONTROL <ul style="list-style-type: none"> 1. Control 2. Train Separation and Signals 3. Automatic Warning/Braking Systems 4. European Train Control System (ETCS) 5. Interlocking ➤ OPERATIONAL ISSUES <ul style="list-style-type: none"> 1. General 2. Problems with mixed traffic 3. Junction 4. Problems ➤ ELECTRIFICATION <ul style="list-style-type: none"> 1. Why use electric power 2. Catenary Systems <p>Airport Engineering:</p> <ul style="list-style-type: none"> 1. Runway 2. Airport Terminal 3. Apron 4. Taxiway 5. Aircraft Stand 6. Hanger 7. Control Tower 8. Parking 	
<p>18. Practical Topics (If there is any)</p>	
<p>no</p>	

19. Examinations:

Theory:

Exam papers usually contain 4 or 5 questions on question about %30 is about theoretical lectures the rest are computational questions.

20. Extra notes:

no