



EE 399 SUSTAINABLE TRANSPORTATION

IES Abroad Madrid

DESCRIPTION:

- 1 Trends - Economical importance. Why railways are the main sustainable transportation.
- 2 The Railway system.
- 3 Infrastructure and track.
- 4 Track laying & maintenance.
- 5 Energy Distribution.
- 6 Signaling.
- 7 Rolling stock.
- 8 Traction systems.
- 9 Brake systems.
- 10 Bogie.
- 11 Carbody.

CREDITS: 1 credit

CONTACT HOURS: 14 hours

LANGUAGE OF INSTRUCTION: English

PREREQUISITES: None.

ADDITIONAL COST: None.

METHOD OF PRESENTATION:

1 hour of lecture per week (the instructor will present the theory and cover examples and videos about the state of the art). There will be one visit related to the course from Atocha AVE Station to Toledo in High Speed Train.

REQUIRED WORK AND FORM OF ASSESSMENT:

- Midterm exam - 30%
- Final exam - 30%. MCQ 20 questions 5/100 each.
- Written assignments - 25%
- Participation - 15%

Course Element

Description of the course element

LEARNING OUTCOMES:

By the end of the course, students will be able to:

- Understand the importance of the train in the transportation sector.
- Know the most important aspects of the railroad world.
- Know the advantages and disadvantages of rail transport.
- Learn technical vocabulary about the railroad sector.
- Have a general vision of an economically stable sector with a great future projection for USA and the rest of the world.

ATTENDANCE POLICY:

As a member of our class community, you are expected to be present and on time every day. Attending class has an impact on your learning and academic success. For this reason, attendance is mandatory for all IES Madrid classes, including course-related excursions. Absences will only be excused in cases of documented medical or family emergencies. Any assessed work, including exams, tests, and

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presentations, will be rescheduled if the absence is justified; otherwise, it will be graded as 0. You are allowed a maximum of 1 unexcused absence for once-a-week courses and 2 unexcused absences for twice-a-week courses. Each additional absence will deduct 5 points from your final grade. Accumulating 7 or more absences in twice-a-week courses, or 4 or more in once-a-week courses, may lead to a failing grade. Students arriving more than 11 minutes after the scheduled start time will be marked as 'late.' Three 'late' arrivals will be counted as 1 absence. Any student arriving 30 minutes or more after the scheduled start time will be marked as 'absent.' For more information, please refer to the full [Attendance and Punctuality Policy](#) document.

CONTENT:

Choose an item	Content	Assignments
Session 1	Trends - Economical importance. Why railways is the main sustainable transportation.	Materials as presentation and videos will be upload in moodle.
Session 2	The Railway system	
Session 3	Infrastructure and track I	
Session 4	Infrastructure and track II	
Session 5	Track laying & maintenance	
Session 6	Energy Distribution	
Session 7	Signaling	
Session 8	Rolling stock.	
Session 9	Traction systems.	
Session 10	Brake systems	
Session 11	Bogie.	
Session 12	Carbody.	

Session 13	Passengers comfort.	
Session 14	High Speed Lines in Spain and Europe	

COURSE-RELATED TRIPS:

- Trip from Madrid to Toledo by High Speed Train. We will travel from central station of Atocha in Madrid to the historic city of Toledo. We will go by High Speed Train (AVE) (33 minutes, one way).

REQUIRED READINGS:

- "Railway Track Engineering" J. S. Mundrey. 2013.

RECOMMENDED READINGS:

- "Railway Management and Engineering" Dr. J. Allan. 2021.
- "Rail Economics, Policy and Regulation in Europe" Matthias Finger y Pierre Messulam. 2020.
- "Railway Automation and Control Systems" Avinash Unnikrishnan y Rangan Banerjee. 2019
- "The Future of Railroads: Impacts for Energy, Environment and Development" Joel R. Rahn. 2016