

SD2307 Rail Vehicle Technology

Grading criteria developed in LH216V 2016 by Carlos Casanueva Perez.

Reflection

The course uses grading criteria in order to evaluate separately each of the Intended Learning Outcomes. For the students to pass the course, they should fulfill all the ILOs. This is, each of the ILO should have at least grade E. The ILOs are:

1. *explain how all train subsystems work and can be improved.* This ILO represents the knowledge of the different parts that compose a train, and their function within the whole. It also assesses the capabilities of the student for critically studying a part of the whole in order to improve it in a sensible way. The more complex and elaborated the subsystems and improvements are, the higher the final grade will be for this specific ILO.
2. *calculate train performance.* This ILO shows that the student is capable of doing performance calculations for a given vehicle and setup. The more open the solved problem, the higher the grade.
3. *determine outer dimensions and interior design given an operational task.* This ILO deals with the needs of the train to fit in a specific infrastructure (outside) and the comfort of the people travelling in the vehicle (inside). If the student can make case-dependent judgments and improvement suggestions, the grading will be higher.
4. *discuss the trends and future potential for rail vehicles.* This ILO assesses the need of a railway engineer to improve and develop the behavior of existing vehicles. Extending the trends and potential more than the actual vehicle, i.e. to other stakeholders in the railway system, would give a higher grade.

The grading criteria are evaluated in different parts of the course. The different activities that are evaluated are:

- Written project report (WPR): the different sections of the report will allow the evaluation of the following ILOs:
 - o Train subsystems
 - o Train performance
 - o Outside and inside
- Oral project presentation (OPP): during the oral presentations, questions will be asked about the project that will allow the reviewers to evaluate the following ILOs:
 - o Train subsystems
 - o Trends and potential
- Written exam (WEX): the written exam will have questions for all the ILOs, and for each level E-A. In order to get a specific level, 80% of the questions of that level should be answered correctly.

After the evaluation of the different activities, the final grade will be combined in the following way:

$$\text{Train subsystems grade} = 0.3 \cdot \text{MAX}(WPR, OPP) + 0.7 \cdot WEX$$

$$\begin{aligned} \text{Train performance grade} &= 0.2 \cdot WPR + 0.8 \cdot WEX \\ \text{Outside and inside grade} &= 0.2 \cdot WPR + 0.8 \cdot WEX \\ \text{Trends and potential grade} &= 0.3 \cdot OPP + 0.7 \cdot WEX \end{aligned}$$

$$\text{Final grade} = 0.3 \cdot \text{Train subsystems} + 0.35 \cdot \text{Train performance} + 0.2 \cdot \text{Outside and inside} + 0.15 \cdot \text{Trends and potential}$$

This weighting of the different ILOs represents the relative importance of each of them according to course design.

ILO assessment map

Short name	ILO	Project report	Project presenta.	Written exam
Train subsystems	Explain how all train subsystems work and can be improved	x	x	x
Train performance	Calculate train performance	x		x
Outside and inside	Determine outer dimensions and interior design given an operational task	x		x
Trends and potential	Discuss the trends and future potential for rail vehicles		x	x

All of them are assessed F-A

Adjust the examination to the criteria

The examination is carried out in three different activities: Written project report (WPR), Oral project presentation (OPP) and Written exam (WEX). Each of the ILOs is examined in the following activities:

	WPR task 1a	WPR task 1b	WPR task 2	OPP	WEX
Train subsystems		x	x	x	x
Train performance	x	x	x		x
Outside and inside		x	x		x
Trends and potential				x	x

In the written exam (WEX), there will be questions assessing individually from E to A level for each of the subsystems, which include all the 4 ILOs. That would be a minimum of 20 questions.

Grading Criteria

	E	D	C	B	A
ILO1	List all the different subsystems and their functionality. Suggest improvements for some subsystems.	E, plus: List different types of components for all subsystems. Judge if a subsystem is critical regarding safety.	D, plus: Discuss pros and cons of each type of component or system. Suggest improvements for all subsystems.	C, plus: Discuss conflicting requirements in the interaction between different subsystems. Judge if the interaction is safety critical.	B, plus: Optimize different subsystems with conflicting requirement regarding the overall gain in vehicle performance.
	Assessed in the Project Report, Project Presentation, and Written Exam.				
ILO2	Be able to calculate the basic performance variables: acceleration and braking capacity, average speed and energy usage.	E, plus: A clear description of the calculation process.	D, plus: Given an open problem regarding the performance of a rail vehicle, calculate acceleration and braking capacity, average speed and energy usage.	C, plus: A clear description of the calculation process.	B, plus: Given an open problem regarding the performance of a rail vehicle, be able to list the provided information, look for missing data, discuss the selected assumptions, and correctly solve its acceleration and braking capacity, average speed and energy usage.
	Assessed in the Project Report and Written Exam.				
ILO3	Calculate exterior size of the carbody. List characteristics of the interior design for one type of vehicle. Calculate passenger flow rates.	E, plus: List all the external elements that affect the size of the carbody. List characteristics of the interior design for several types of vehicles.	D, plus: List all the train elements that affect the interior distribution, and judge the suitability of their placement. Discuss and propose solutions for better accessibility and improved passenger flow rates.	C, plus: Solve the inclusion of carbody tilting and/or centering systems regarding both exterior size and interior design.	B, plus: Detect and discuss functional conflicts within exterior size of the carbody and/or interior design, and other subsystems. Go beyond course literature with interior design proposals, discussing its pros and cons.
	Assessed in the Project Report and Written Exam.				
ILO4	Discuss one trend and its benefits for each of the different subsystems	E, plus: Discuss also the drawbacks of the listed trends	D, plus: Discuss the pros and cons of the key trends for each of the subsystems. Explain why they are not implemented nowadays.	C, plus: Discuss the needs regarding involvement of different stakeholders for each trend.	B, plus: Judge and discuss the likely time frame of application, cost, and/or main beneficiaries among the stakeholders.
	Assessed in the Project Presentation and Written Exam.				

Grade combination

Each ILO will be graded as follows, considering values 1-5 for grades E-A:

$$\textit{Train subsystems grade} = 0.3 \cdot \textit{MAX}(WPR, OPP) + 0.7 \cdot \textit{WEX}$$

$$\textit{Train performance grade} = 0.2 \cdot \textit{WPR} + 0.8 \cdot \textit{WEX}$$

$$\textit{Outside and inside grade} = 0.2 \cdot \textit{WPR} + 0.8 \cdot \textit{WEX}$$

$$\textit{Trends and potential grade} = 0.3 \cdot \textit{OPP} + 0.7 \cdot \textit{WEX}$$

The final grade will be a weighted sum of the 4 ILOs as follows:

$$\textbf{Final grade} = 0.3 \cdot \textit{Train subsystems} + 0.35 \cdot \textit{Train performance} + 0.2 \cdot \textit{Outside and inside} + 0.15 \cdot \textit{Trends and potential}$$