Course guide
2400308 - 240MAU23 - Transmission Systems and Performance

Last modified: 25/06/2026

Unit in charge: Barcelona School of Industrial Engineering
Teaching unit: 712 - EM - Department of Mechanical Engineering.

Degree: MASTER'S DEGREE IN AUTOMOTIVE ENGINEERING (Syllabus 2026). (Compulsory subject).

Academic year: 2026 **ECTS Credits:** 5.0 **Languages:** Catalan

LECTURER

Coordinating lecturer: Puig Ortiz, Joan

Others: Sisa Matas, Josep

PRIOR SKILLS

Basic knowledge of mechanical design and mechanics.

TEACHING METHODOLOGY

Theory classes based on teacher exposure, supported by demonstrations and examples. Students will apply these teachings guided by professor into a collection of proposed exercises.
Practical sessions, in small groups, to check the physical parts described into regular classes.

LEARNING OBJECTIVES OF THE SUBJECT

To apply motor-receptor model into a vehicle to get the required performance.
To know the basic elements from a vehicle drivetrain, its function and basic knowledge of calculus to be able to select the most appropriated unit based on product solicitations.

STUDY LOAD

Type	Hours	Percentage
Self study	80,0	64.00
Hours small group	15,0	12.00
Hours large group	30,0	24.00

Total learning time: 125 h

CONTENTS

Longitudinal performance: Motor characteristics and resistent forces. Traction diagram (F-v)

Description:
Definition of motor characteristics involved into vehicle performance calculations.
Usage of load-Velocity diagram as a tool to challenge vehicle performance and understand how to use motor sweet points.

Specific objectives:
To know and understand motor characteristic curves.
To translate motor capacities to tyre requirements to get the final vehicle performance.

Related activities:
Resolution of numerical exercise to get vehicle/motor performance.
Practical session to develop an excel sheet to automatize these calculations.

Full-or-part-time: 30h
Practical classes: 6h
Laboratory classes: 4h
Self study : 20h

Drivetrain. Main layouts and basic components

Description:
Main components description based on function and principal layouts of commercial drive trains.

Specific objectives:
To know the main drive train components based on vehicle type or traction mode.
To know the main drive train components based on vehicle powertrain.

Related activities:
Practical session on a real car to see these elements and understand its location and contribution to the vehicle.

Full-or-part-time: 18h
Practical classes: 6h
Laboratory classes: 2h
Self study : 10h

Drive train: Gearbox

Description:
The Gearbox as a link between engine & wheels. Purpose, performance & basic design criterias.
Main commercial gearboxes and how they work.

Specific objectives:
To understand why we need a gearbox into the vehicle and how to define basic requirements for this unit.

Related activities:
Practical session to disassemble and check a gearbox.

Full-or-part-time: 31h
Practical classes: 7h
Laboratory classes: 4h
Self study : 20h

Drive train: Clutch system, torque converters, final drives & drive shafts.

Description:
To describe the function of drive train Systems such as clutch, torque converter and final drive.
To explain why are needed those Systems and what elements constitute these systems.

Specific objectives:
To learn how to define a clutch and final drive systems.

Related activities:
Practical session to disassemble and check a clutch system and a final drive.

Full-or-part-time: 31h
Practical classes: 7h
Laboratory classes: 4h
Self study : 20h

Tyres. Basic characteristics

Description:
Tyre characteristics
Commercial naming for tyres (normative)

Specific objectives:
To know tyre basic characteristics.
To know the identification rules behind tyres characteristics.

Related activities:
Practical session to see tyre and rim structure.

Full-or-part-time: 15h
Practical classes: 4h
Laboratory classes: 1h
Self study : 10h

GRADING SYSTEM

The final qualification of the course is obtained by means of:
Nfinal = 0,2*Nprac.+0,8*màx (Npf , 0,7*Npf + 0,3*Npp)
Where: Nprac.: mark of practical sessions; Npf : mark of the final exam; Npp : mark of the midterm exam.

A special exam will be offered in July to those students that have not passed the subject. The mark obtained with this exam, Nreav, replaces the final exam mark, Npf.

EXAMINATION RULES.

In addition to the basic writing tools and calculator, to conduct the exams it is allowed to bring a handwriting A4 sheet with formulas or schemes. Content is free. This paper should be delivered to the teacher at the end of exam.

BIBLIOGRAPHY

Complementary:
- Calero Pérez, Roque; Carta González, José Antonio. Fundamentos de mecanismos y máquinas para ingenieros . Madrid [etc.] : McGraw-Hill, 1999. ISBN 844812099X.
- Budynas, Richard G; Nisbett, J. Keith ; Shigley, Joseph Edward ; Dorador González, Jesús Manuel; Ramírez Cruz, José Luis; Zepeda Sánchez, Antonio. Diseño en ingenieria mecánica de Shigley . Undécima edición. Ciudad de México : McGraw-Hill, 2021. ISBN 9781456287610.
- Naunheimer H. [et al.]. Automotive transmissions : fundamentals, selection, design and application [on line]. 2nd ed. New York: Springer, 2010Available on: https://link-springer-com.recursos.biblioteca.upc.edu/book/10.1007/978-3-642-16214-5. ISBN 3642162142.

RESOURCES

Audiovisual material:
- Apunts de classe. Notes and presentations provided by the teaching staff in class exhibitions. Collection of problems prepared by the teaching staff (in Catalan).