



## Course guide

# 220129 - MDS - Motorbikes Design and Secrets

**Last modified:** 02/04/2024

**Unit in charge:** Terrassa School of Industrial, Aerospace and Audiovisual Engineering  
**Teaching unit:** 737 - RMEE - Department of Strength of Materials and Structural Engineering.

**Degree:** BACHELOR'S DEGREE IN AUDIOVISUAL SYSTEMS ENGINEERING (Syllabus 2009). (Optional subject).  
BACHELOR'S DEGREE IN CHEMICAL ENGINEERING (Syllabus 2009). (Optional subject).  
BACHELOR'S DEGREE IN ELECTRICAL ENGINEERING (Syllabus 2009). (Optional subject).  
BACHELOR'S DEGREE IN INDUSTRIAL ELECTRONICS AND AUTOMATIC CONTROL ENGINEERING (Syllabus 2009). (Optional subject).  
BACHELOR'S DEGREE IN MECHANICAL ENGINEERING (Syllabus 2009). (Optional subject).  
BACHELOR'S DEGREE IN TEXTILE TECHNOLOGY AND DESIGN ENGINEERING (Syllabus 2009). (Optional subject).  
BACHELOR'S DEGREE IN AEROSPACE TECHNOLOGY ENGINEERING (Syllabus 2010). (Optional subject).  
BACHELOR'S DEGREE IN AEROSPACE VEHICLE ENGINEERING (Syllabus 2010). (Optional subject).  
BACHELOR'S DEGREE IN INDUSTRIAL DESIGN AND PRODUCT DEVELOPMENT ENGINEERING (Syllabus 2010). (Optional subject).  
BACHELOR'S DEGREE IN INDUSTRIAL TECHNOLOGY ENGINEERING (Syllabus 2010). (Optional subject).

**Academic year:** 2024    **ECTS Credits:** 3.0    **Languages:** English

### LECTURER

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**Coordinating lecturer:** Rafael Weyler

**Others:** Alcalá Vergara, Daniel

### TEACHING METHODOLOGY

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The course is divided into parts:

Theory classes

The theoretical sessions will explain basic concepts of design and how the motorcycle and some of its components works. The explanations will include the motorcycle physics and dynamics and possible improvements through motorcycle and human interaction models.

Practical classes

Practical classes are done in order to understand the importance of the theoretical concepts. The students will get in touch with real machines and how they are designed, manufactured and tuned.

### LEARNING OBJECTIVES OF THE SUBJECT

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This course is intended to introduce students into the engineering applications from the user point of view and not as an engineer, who does not necessarily have such training. This course will focus on a highly technical and specialized automotive discipline such as motorcycling, in which almost everything is related to engineering. It is proposed to show the importance of proper communication, as well as how technical concepts must be properly summarized, transmitted and documented in accordance with the purpose of the device designed. It is also of vital importance and at the same time is overlooked, the role of engineers have into the specification of user skills or the training they should receive in order to manage properly the designed devices.

The course will pay special attention on all these concepts. It will be organized into theoretical lectures and practical classes.



## STUDY LOAD

Type	Hours	Percentage
Hours large group	30,0	40.00
Self study	45,0	60.00

**Total learning time:** 75 h

## CONTENTS

### Module 1: Theory

**Description:**

1. Introducing Motorcycles
2. Motorcycle Mechanics
3. Dynamic Principles
4. Chassis Design
5. Alternative and Advanced Designs

**Related activities:**

Theoretical Sessions  
Activity 1: Assignments

**Full-or-part-time:** 45h

Theory classes: 20h  
Self study : 25h

### Module 2: Applied Activities

**Description:**

1. Motorcycle Racing Session
2. Manufacturing Practice3.

**Related activities:**

Practical Sessions  
Activity 2: Project Design

**Full-or-part-time:** 30h

Theory classes: 10h  
Self study : 20h

## GRADING SYSTEM

Activity 1 : 50%

Activity 2 : 50%



## BIBLIOGRAPHY

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### Basic:

- Cossalter, Vittore. Motorcycle dynamics. 2nd english ed. [S.l.]: Lulu Com, 2006. ISBN 9781430308614.
- Bradley, John. The racing motorcycle: a technical guide for constructors. Vol. 1, Gearing, geometry, aerodynamics and suspension. York: Broadland Leisure Publications, 1996. ISBN 9780951292921.
- Bradley, John. The racing motorcycle: a technical guide for constructors. Vol. 2, Chassis materials and construction techniques. York: Broadland Leisure Publications, 2003. ISBN 9780951292938.

### Complementary:

- Simon, B. [et al.]. "Application of the Optimal Maneuver Method for enhancing racing motorcycle performance". SAE international journal of passenger cars: mechanical systems. 2009, vol. 1, núm. 1, p. 1311-1318.
- Cossalter, V. [et al.]. "Evaluation of motorcycle maneuverability with the Optimal Maneuver Method". SAE technical paper. 1998, núm. 983022.