## Mécanique rationnelle II

#### Lecturer

Pierre LAMBERT (Coordinator)

Course mnemonic MECA-H200

**ECTS credits** 5 credits

Language(s) of instruction French

**Course period** First term

**Campus** Solbosch

## Course content

Basics – Solid kinematics in 2D and 3D. Virtual works. Inertia. Solid kinetics. Vectorial and analytical methods (Lagrange). Various problems of solid dynamics. Variable mass systems. Numerical solving of motion equations.

Optional (may change every year) – Hamilton equations. Variational principles. Kepler's laws. Chaos. Impact mechanics.

# Objectives (and/or specific learning outcomes)

Solids and systems of solids dynamics. Write the number of degrees of freedom of a system. Write motion equations. Compute reaction forces. Solve ODE2 numerically.

### Pre-requisits and co-requisits

#### Pre-requisites courses

MECA-H100 | Mécanique rationnelle I | 5 crédits

#### Courses having this one as co-requisit

MECA-H303 | Cinématique et dynamique des machines | 5 crédits and MECA-H305 | Fluid mechanics II | 5 crédits

#### Required knowledge and skills

The course is based on bachelor BA1 courses : algebra, analysis, mechanics (systems statics and point dynamics), physics, informatics and introduction to engineering sciences.

More particularly, the following concepts are assumed to be mastered : free body diagram, partial and total derivatives of a

function with n variables, equilibrium equations, analytical solving of simple ODE2 equations, among which the harmonic oscillator.

## Teaching method and learning activities

Therory (syllabus), exercises, practical labs, Q&A sessions.

# References, bibliography and recommended reading

Courses notes (« syllabus ») of "Mécanique rationnelle II" and related references

## Course notes

Syllabus and Université virtuelle

## Other information

#### Place(s) of teaching

Solbosch

Contact(s) Pierre LAMBERT, TIPs, http://plambert.ulb.be

## Evaluation method(s)

Other

### Evaluation method(s) (additional information)

January (written examination) + mandatory participation to experimental labs

# Determination of the mark (including the weighting of partial marks)

#### First session

- > Written examination : exercises and theory studied in the course, the exercises, and the labs.
- > Mandatory participation to labs. Absence will lead to a penalty applied to the examination grade.

#### Second session

- > Written examination : exercises and theory studied in the course, the exercises, and the labs.
- > Mandatory participation to labs. Absence will lead to a penalty applied to the examination grade.

### Main language(s) of evaluation

French

## Programmes

Programmes proposing this course at the Brussels School of Engineering BA-IRCI | Bachelor in Engineering Sciences | option Bruxelles/unit 2