

# Introduction aux sciences appliquées

**Lecturer**

Dimitri GILIS (Coordinator)

**Course mnemonic**

TRAN-H100

**ECTS credits**

8 credits

**Language(s) of instruction**

French

**Course period**

First term

## Course content

Science part: Dimensions, units and the International System of Units - Resolution of sets of linear equations - Matter - Graphical operations - Exponentials and logarithms - Coordinate sets and symmetries - Calculation of limits - Introduction to thermodynamics - Complex numbers - Vectors and vector spaces - Aqueous solutions - Matrices - Determinants - Scalar and vector products - Notion of torque - Chemical transformations of matter - Partial derivative - Exploitation of experimental measurements - Euclidian analytic geometry - Primitive functions and integrals - Set of forces and reduction - Circulation, flow and flux.

English part: This course aims at an integrated approach, in which the five skills (listening, reading, take part in a conversation, continuous oral expression and writing) are addressed. A special emphasis is put on the listening skill, which is the basis skill in the learning process of a language. The student will be introduced to the English phonetic and phonologic system (pronunciation, intonation,...) through audiovisual workshops inspired from English-taught lectures. This course will give him/her the possibility to enlarge his/her vocabulary and to develop his/her grammatical, syntactic and lexical notions.

## Objectives (and/or specific learning outcomes)

Science part: Review fundamental notions in sciences and make sure they have been correctly learned by all students. Offer a series of graded exercises (basic and advanced levels) and additional exercises to practice at home. Introduce new concepts used in various courses of the Bloc 1, insisting on the complementarity of these courses and introducing the different notations often used at the Ecole polytechnique.

Disciplinary learning outcomes:

- Master the basic mathematical tools used in the courses of the Bloc 1.
- (Re)view the fundamental notions in physics and chemistry.
- Understand the link between these subjects.

Non-disciplinary learning outcomes:

- Learn to set up the mathematical equations to solve a problem in sciences (physics, chemistry), i.e. to use mathematical tools in non-mathematical environments.
- Learn to write a scientific rationale such as a logical reasoning, the solution of an exercise,...
- Learn the mathematical rigour.
- To gauge one's method of study at the university: *Connaissances Fondamentales* is the first course in which students are evaluated at the Ecole polytechnique. The students can hence use this early test to evaluate their working technique already in November and correct it if needed.

English part: At the least, reach the level B1+ on the scale of the Common European Framework of Reference for Languages for the listening skill: the learner understands the main ideas and most of the details in discussions and lectures related to engineering, he or she understands the bulk of radio or TV broadcasts on engineering.

## Pre-requisites and co-requisites

### Courses having this one as co-requisit

MATH-H1002 | Analyse I | 5 crédits and MATH-H2000 | Analyse II | 8 crédits

## Teaching method and learning activities

Science part: Lectures + recitations

English part: Tutorials in small groups (about 25 students). The students are split according to their English level: elementary (A1 and A2), lower intermediate (B1), and upper intermediate (B2).

## Contribution to the teaching profile

The science part takes place during the first six weeks of the academic year. Its main goal is to make sure the science level of the students is sufficient to follow the other courses of the Bloc 1, which begin mostly at the seventh week of the term.

This part of the teaching unit reviews the fundamental scientific notions of the high-school programme, including mathematics, and introduces new concepts, which will be used in the other courses of the Bloc 1.

The English part aims at improving the level of the student in English from their beginning of their studies at the Ecole polytechnique. Not only is English the most common language in science and technique, but most of our master programmes are available in English, which requires our students to acquire strong bases during their Bachelor. The goal is to reach a level B1 or B2 at the end of the Bachelor.

## References, bibliography and recommended reading

The lecture handouts can be bought at the Presses Universitaires de Bruxelles and the pdf file is available on the UV.

The handouts for the science part are also included within the colis-cours sold by the Cercle Polytechnique

<http://www.cerclepolytechnique.be/activites/social/colis-cours/>

## Other information

### Contact(s)

Science part: Pierre Capel; e-mail : [pierre.capel@ulb.ac.be](mailto:pierre.capel@ulb.ac.be)

English part: Matthew Langsley; e-mail : [matthew.langsley@ulb.ac.be](mailto:matthew.langsley@ulb.ac.be)

## Evaluation method(s)

Other

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

Science part: Written tests consisting solely of exercises of the same level as the advanced-level exercises of the recitation sessions. One test takes place at the end of the course (i.e. end of October) and one remedial test is organised at the beginning of the January exam period. If succeeded, i.e. with a grade of 10/20

or higher, the test of October exempt the students to take the test of January. Note that there are no remedial tests during the third term.

English part: the grade is made up of the student participation to the class (10%), a written essay (20%) and a written exam during the January exam period (70%). This exam includes a listening comprehension and pronunciation exercises in language laboratories. A remedial exam is planned in June and during the third term.

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

The total mark of the teaching unit (N) is obtained from the mark of the science (NS) and English (NE) parts:

$$N = wS \cdot NS + wE \cdot NE,$$

where  $wS = 0,2 + 0,6 \cdot NE/20$  is the weight of the science part in the final mark

and  $wE = 0,8 - 0,6 \cdot NE/20 (= 1 - wS)$  is the weight of the English part in the final mark.

## Programmes

### Programmes proposing this course at the Brussels School of Engineering

BA-IRAR | Bachelor in Engineering : Architecture | unit 1 and BA-IRCI | Bachelor in Engineering Sciences | option Bruxelles/unit 1