

## Faculty of Medicine



SBIM1001

## MATHEMATICAL METHODS IN BIOMEDICAL SCIENCES

[22.5h+22.5h exercises] 4 credits

**Teacher(s):** André Nauts  
**Language:** French  
**Level:** First cycle

### Aims

The objective of this course is to introduce the students to the fundamental notions of linear algebra, calculus and analytical geometry in order to provide them with the basic mathematical tools essential for the biomedical sciences

### Main themes

The course is intended for students with an elementary background in calculus as given in the basic course of physics in BAC1.

It contains:

- an introduction to linear algebra with emphasis on the computation of solutions to systems of linear equations, matrix algebra, eigenvalues, eigenvectors and diagonalization of matrices;
- an introduction to the study of functions of several variables (partial derivatives, differentials, gradients, maxima and minima, Lagrange multipliers, multiple integrals) and systems of differential equations with a view on applications;
- an introduction to analytical geometry, in particular to the equations and properties of straight lines, conics and quadrics;
- a good deal of illustrations and applications to pharmacokinetics, chemical and enzymatic kinetics, genetics, statistics, thermodynamics#

### Content and teaching methods

- Linear algebra : systems of linear algebraic equations, solution procedures by Gauss-Jordan elimination, matrix algebra, rank theory, inversion, eigenvalues, eigenvectors and diagonalization of matrices;
- Complex numbers and periodic functions, limits, indeterminate forms, L'Hôpital's rule, Taylor series, functions of several variables, Lagrange multipliers, multiple integrals, systems of differential equations;
- Analytical geometry: equations and properties of the straight line, the plane, conics and quadrics;
- Applications to pharmacokinetics, chemical and enzymatic kinetics, genetics, statistics, thermodynamics# ;

#### METHODS:

Lectures and supervised practical works (in small groups) are organized weekly. The practical works, in close connexion with the lecture of the week, are not restricted to mere applications of recipes but require an active involvement of the students, who are encouraged to establish the link between theory and practice

**Other information (prerequisite, evaluation (assessment methods), course materials recommended readings, ...)**

**PREREQUISITE :** Background in mathematics as given in the course of physics (BAC 1).

**ASSESSMENT :** Written and oral examination.

**TEACHING AIDS :** Notes written by the teacher, overhead transparencies, practical works supervised by the teacher and one or two assistants

### Programmes in which this activity is taught

**SBIM3DS**          Diplôme d'études spécialisées en sciences biomédicales

**Other credits in programs**

<b>MED12BA</b>	Deuxième année de bachelier en médecine	(4 credits)	Mandatory
<b>SBIM11BA</b>	Première année de bachelier en sciences biomédicales	(4 credits)	Mandatory