INSTITUT NATIONAL DES SCIENCES APPLIQUÉES LYON

DPT BIOSCIENCES
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Mathematics and Modeling

Biomathematics 3: Advanced Ordinary Differential Equations

IDENTIFICATION

CODE :	BS-3-S2-EC-BMMATH3
ECTS :	3.0

HOURS

Lectures :	14.0 h
Seminars :	24.0 h
Laboratory :	0.0 h
Project :	0.0 h
Teacher-student contact :	38.0 h
Personal work :	37.0 h
Total :	75.0 h

ASSESSMENT METHOD

2 x 2h and 1 practical report

TEACHING AIDS

TEACHING LANGUAGE

English

CONTACT

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AIMS

The educational objective of this module is to learn the qualitative study of dynamical systems and their applications in population dynamics.

At the conclusion of this module the student will have to be capable of:
- solving systems of ordinary differential equations (analytic and numerical) by analytical or numerical methods,
- to put in equation (to model) a particular biological problem.

CONTENT

- Bifurcations in R.
- First integrals, functions of Lyapunov, limit cycle and theorem of Poincaré-Bendixson.
- Bifurcations in R 2 (Poincaré-Andronov-Hopf theorem).
- EDO digital integration schemes.
- TP under R.

BIBLIOGRAPHY

1. Mathemical Models in Biology - Edelstein-Keshet, L - McGrawHill - 1988
2. Mathematical Biology - Murray, JD - Springer Verlag - 1993
3. Modélisation en Biologie et Ecologie - Pavé, A. - Aléas - 1994
4. Equations différentielles - M. Crouzeix, M. Mignot - Masson Editeur - 1983
5. Analyse numérique et équations différentielles - J.P. Demailly - Masson Editeur - 1989
6. Solving Ordinary differntial equations - H. Hairer, G. Wanner - Springer Verlag Editeur - 1983

PRE-REQUISITE

Solving simple ordinary differential equations.