

Content

| Course Code | Course Name | Semester | Theory | Practice | Lab | Credit | ECTS |
|-------------------------|--|----------|--------|----------|-----|--------|------|
| MAT203 | Differential Equations | 4 | 3 | 2 | 0 | 5 | 8 |
| Prerequisites | | | | | | | |
| Admission Requirements | | | | | | | |
| Language of Instruction | French | | | | | | |
| Course Type | Compulsory | | | | | | |
| Course Level | Bachelor Degree | | | | | | |
| Objective | To master: Existence and uniqueness of the solution to ordinary differential equation, Lipschitz condition, second-order linear differential equation, linear system of first-order differential equations. | | | | | | |
| Content | Existence and uniqueness of the solution to ordinary differential equation, Lipschitz condition, second-order linear differential equation, linear system of first-order differential equations. Équations différentielles ordinaires, Etudes qualitatives, Dominique Hulin, Notes de Cours à L'université Paris Sud. Cours de mathématiques, tome 4 : Équations différentielles, intégrales multiples - Cours et exercices corrigés, Jacqueline Lelong-Ferrand et Jean-Marie Arnaudès, Dunod. | | | | | | |
| References | Calcul différentiel et équations différentielles - Sylvie Benzoni-Gavage Mathématiques tout-en-un pour la licence 2 - Halberstadt, Ramis, Sauloy, Buff, Moulin Équations différentielles ordinaires - Millot Équations différentielles ordinaires - Gallouet | | | | | | |

Theory Topics

| Week | Weekly Contents |
|------|--|
| 1 | Cauchy's problem |
| 2 | Solution in dimension one |
| 3 | Exponentials of matrices |
| 4 | Solution in higher dimensions |
| 5 | Non-homogeneous equations |
| 6 | Cauchy-Lipschitz theorem |
| 7 | Dependence on initial conditions, Grönwall's inequality |
| 8 | Midterm |
| 9 | Qualitative study of autonomous fields |
| 10 | Stability and attractivity of an equation |
| 11 | Linear differential equations with constant coefficients |
| 12 | Non-homogeneous linear differential equations |
| 13 | Wronskian |
| 14 | |