**Content**

| Course Code | Course Name | Semester | Theory | Practice | Lab | Credit | ECTS |
|---|---|---|---|---|---|---|---|
| MAT351 | Measure Theory | 6 | 3 | 0 | 0 | 3 | 5 |

| Prerequisites | |
|---|---|
| Admission Requirements | |

| Language of Instruction | French |
|---|---|
| Course Type | Elective |
| Course Level | Bachelor Degree |
| Objective | To introduce the fundamentals of measure theory, with its applications to integration theory and probability theory. |
| Content | Measures and sigma-algebras, Borel and Lebesgue measurable sets, Measurable functions, Lebesgue measure on R^n, Lebesgue integral, Convergence theorems: Monotone Convergence Theorem (MCT), Fatou's Lemma, Dominated Convergence Theorem (DCT) |
| References | Mesure, Intégration, Eléments d'Analyse Fonctionelle, lecture notes of Petru Mironescu, Université Claude Bernard Lyon 1: https://math.univ-lyon1.fr/~mironescu/resources/complet_mesure_integration.pdf |

**Theory Topics**

| Week | Weekly Contents |
|---|---|
| 1 | Review of Riemann Integral, Motivation for the need of a more general theory |
| 2 | sigma-algebras, Borel sets |
| 3 | Measurable functions |
| 4 | Measures |
| 5 | Negligable sets, Lebesgue measure |
| 6 | Constrution of Lebesgue measure |
| 7 | Integral of a measurable function |
| 8 | Midterm |
| 9 | Integral of a measurable function, Monotone Convergence Theorem |
| 10 | Integration |
| 11 | Fatou's Lemma, Dominated Convergence Theorem |
| 12 | Product measure |
| 13 | Fubini-Tonelli Theorem |
| 14 | Fubini-Tonelli Theorem |