

MATH-305

Espaces de Sobolev et équations elliptiques

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Cursus	Sem.	Type
Mathématiques	BA5	Opt.

Langue d'enseignement	français
Crédits	5
Session	Hiver
Semestre	Automne
Examen	Ecrit
Charge	150h
Semaines	14
Heures	4 hebdo
Cours	2 hebdo
Exercices	2 hebdo
Nombre de places	

Résumé

C'est un cours d'introduction aux équations différentielles partielles elliptiques linéaires.

Contenu

1. Harmonic functions. Mean value properties. Fundamental solutions. Green's identities. Maximum principles. Caccioppoli's inequality.
2. Sobolev spaces. Sobolev's inequality, Poincaré's inequality, Rellich-Kondrachov's inequality. Trace theorems.
3. Dirichlet problems. Existence and uniqueness of weak solutions. Lax-Milgram's theorem and compactness arguments. Maximum's principle. A connection with variational method.
4. Neumann problems. Existence and uniqueness of weak solutions. Lax-Milgram's theorem and compactness arguments. A connection with variational method.
5. Mixed boundary problems. An example.
6. Separation of variables. Solving Laplace's equations in a ball and in a circular. Three spheres inequality.
7. Laplace equation in unbounded domains.

Compétences requises**Cours prérequis obligatoires**

The students are strongly recommended to have sufficiently knowledge on real analysis, theory of integrations. Having taken a functional analysis course will be an advantage.

Concepts importants à maîtriser

By the end of the course, the student must be able to:

- Apply basic theory to solve several problems in sciences
- Analyze partial differential equations

Méthode d'évaluation

Exam written

Dans le cas de l'art. 3 al. 5 du Règlement de section, l'enseignant décide de la forme de l'examen qu'il communique aux étudiants concernés.