



# UE Introduction to numerical field computation

 ECTS  
3 crédits

 Crédits ECTS  
Echange  
3.0

 Composante  
UFR PhITEM  
(physique,  
ingénierie, terre,  
environnement,  
mécanique)

 Période de  
l'année  
Printemps (janv.  
à avril/mai)

- > **Langue(s) d'enseignement:** Anglais
- > **Ouvert aux étudiants en échange:** Oui
- > **Crédits ECTS Echange:** 3.0
- > **Code d'export Apogée:** PAX8ECAD

## Présentation

### Description

This course is an introductory course on numerical field computation using the finite difference and the finite element methods.

### Objectifs

**Content:**

- Finite difference method.
- Finite element method:
  - Strong and weak formulations.
  - Finite element analysis : domain discretization, local and global interpolation, numerical integration, assembly, resolution of linear system, etc.

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## Heures d'enseignement

UE Introduction to numerical field computation - CM/TD	Cours magistral - Travaux dirigés	16h
UE Introduction to numerical field computation - TP	TP	12h

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## Pré-requis recommandés

Familiarity with the following content of the course "Numerical Methods" :

- Approximation and interpolation.
  - Numerical integration.
  - Numerical linear algebra:
    - Fast linear solvers (direct and iterative).
    - Fast eigen-solvers.
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## Syllabus

1. Meunier, G. (2010). *The finite element method for electromagnetic modeling*, John Wiley & Sons.
2. Jin, J. M. (2015). *The finite element method in electromagnetics*, John Wiley & Sons.

**Période** : Semestre 8

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## Compétences visées

At the end of the course, the student should be able to:

- Generate and discretize simple 2D geometries.
- Generate and run a finite difference code, and analyze its results for a simple 2D elliptic equation.
- Generate and run a simple finite element code, and analyze results for a simple 2D elliptic equation.

## Infos pratiques

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### Campus

› Grenoble - Polygone scientifique