

## MAT234: PARTIAL DIFFERENTIAL EQUATIONS (PDEs)

**About the course:** A partial differential equation is an equation involving a function of several variables and its partial derivatives. Many natural laws come in the form of partial differential equations. These equations are important in natural sciences, engineering disciplines, finance, and pure mathematics. The course aims at giving the student a good understanding of the basic methods and fundamental theories of this interesting field of mathematical analysis.

**Lectures:** Monday and Tuesday 14:15-16:00, room  $\pi^4$

Exercises: Tuesday 15:15-16:00, room  $\pi^4$

**Start date:** 21 August

**Lecturer:** Achenef Tesfahun

**Textbook:** L. C. Evans: Partial Differential Equations, American Mathematical Society, 2nd edition, 2010.

**Final curriculum:** Selected topics from the text book and lecture notes:

- Chapter 1: Some preliminaries; Introduction to PDE (more materials than the what is in book)
- Chapter 2: Four important linear PDE: 2.1; 2.2 (except 2.2.3c,d,e, f); 2.3 (except 2.3.3b,c , 2.3.4b); 2.4
- Chapter 3: Nonlinear first-order PDE: 3.4.1a, b
- Chapter 4 : Other ways to represent solutions: 4.1, 4.2.1a, b, 4.3.1a, b,
- Sobolev spaces and weak solution to second-order elliptic equations (Lecture notes: uploaded at [mitt.uib.no](http://mitt.uib.no))
- The mandatory assignment and exercises sets 1–8 are also part of the curriculum

### Evaluation:

- Mandatory exercises
- Final exam (oral); 11–14 December

**Remark:** The lectures contain more details and examples than the book.

### Extra literature:

- W. Strauss: "Partial Differential Equations: an Introduction".
- A. Tveito and R. Winther: "Introduction to Partial Differential Equations
- S. Salsa: "Partial Differential Equations in Action".