Fractional Sobolev Spaces

Instructor: Giovanni Leoni, email: giovanni@andrew.cmu.edu.

Description of the Course:

- Fractional Sobolev spaces, introduction and main properties.
- Approximation by smooth functions.
- The spaces $W_0^{s,p}$ and $W_{00}^{s,p}$
- Embeddings.
- Extensions
- Traces.

Prerequisites:

- Functions of several variables;
- Lebesgue integration theory;
- L^p spaces;
- some functional analysis;
- sequences and series of functions.

Some reference books are listed below.

References

[1] Adams, Robert A.; Fournier John J.F. Sobolev spaces. Second edition. Academic Press (Elsevier), 2003.

[2] Brezis, Haim Functional analysis, Sobolev spaces and partial differential equations. Universitext. Springer, New York, 2011.

[3] Demengel, Françoise; Demengel, Gilbert Functional spaces for the theory of elliptic partial differential equations. Translated from the 2007 French original by Reinie Erné. Universitext. Springer, London; EDP Sciences, Les Ulis, 2012.

[4] Leoni, Giovanni A first course in Sobolev spaces. Second edition. Graduate Studies in Mathematics, 181. American Mathematical Society, Providence, RI, 2017.

[5] Maz'ja, Vladimir G. Sobolev spaces. Translated from the Russian by T. O. Shaposhnikova. Springer Series in Soviet Mathematics. Springer-Verlag, Berlin, 1985.

[6] Natanson, I. P. Theory of functions of a real variable. Translated by Leo F. Boron with the collaboration of Edwin Hewitt. Frederick Ungar Publishing Co., New York, 1955.

[7] Nečas, Jindřich Les méthodes directes en théorie des équations elliptiques. (French) Masson et Cie, Éditeurs, Paris; Academia, Éditeurs, Prague 1967.

[8] Tartar, Luc An introduction to Sobolev spaces and interpolation spaces. Lecture Notes of the Unione Matematica Italiana, 3. Springer, Berlin; UMI, Bologna, 2007.

[9] Triebel, Hans Interpolation theory, function spaces, differential operators. Second edition. Johann Ambrosius Barth, Heidelberg, 1995.