## Function Spaces (C003570)

**Course size** _(nominal values; actual values may depend on programme)_

**Credits 6.0**          **Study time  180 h**

**Course offerings and teaching methods in academic year 2025-2026**

| A (semester 2) | Dutch | Gent | lecture |
| | | | seminar |

**Lecturers in academic year 2025-2026**

| De Bie, Hendrik | TW06 | lecturer-in-charge |
| Barbier, Sigiswald | TW06 | co-lecturer |

| Offered in the following programmes in 2025-2026 | crdts | offering |
|---|---|---|
| Bachelor of Science in Mathematics | 6 | A |
| Preparatory Course Master of Science in Mathematics | 6 | A |

**Teaching languages**

Dutch

**Keywords**

Function spaces, Fourier transform, Hilbert spaces, Distribution spaces

**Position of the course**

Gaining knowledge and insight in the theory of function spaces (in particular Lp spaces, spaces of test functions, spaces of distributions), Hilbert spaces, and the Fourier transform of tempered distributions; in this way the student will reach high level competence in this particular field of mathematical analysis.

**Contents**

- Hilbert spaces, orthogonal systems
- Lp spaces, convolution of functions
- spaces of test functions
- Fourier transform on L1, L2 and S
- spaces of distributions
- Fourier transform of tempered distributions

**Initial competences**

Final competences of the course Topology and Metric Spaces.

**Final competences**

1  To acquire a working knowledge of Hilbert spaces.
2  To acquire a working knowledge of Lp spaces.
3  To understand and use the Fourier transform both theoretically and practically.
4  To acquire a working knowledge of distributions.
5  To make connections with other areas of mathematical analysis.
6  To apply the knowledge gained when treating more sophisticated mathematical models.

**Conditions for credit contract**

Access to this course unit via a credit contract is determined after successful competences assessment

**Conditions for exam contract**

This course unit cannot be taken via an exam contract

**Teaching methods**

Seminar, Lecture

**Study material**

Type: Syllabus

Name: Function spaces
Indicative price: € 10
Optional: yes
Language : Dutch
Number of Pages : 151
Oldest Usable Edition : AY22-23
Available on Ufora : Yes
Online Available : No
Available in the Library : No
Available through Student Association : Yes
Additional information: The electronic version of the course notes is freely available on Ufora. Only for a printed version students have to pay.

**References**

F. Brackx and R. Delanghe, The theory of distributions: an introduction. Simon Stevin 53, 1979.
I.M. Gelfand and G.E. Shilov, Generalized functions. Vol. 1. Academic Press, New York, 1964.
M. Reed and B. Simon, Methods of modern mathematical physics I. Functional analysis. Academic Press, New York-London, 1972.

**Course content-related study coaching**

Learning support on individual basis.

**Assessment moments**

end-of-term assessment

**Examination methods in case of periodic assessment during the first examination period**

Written assessment

**Examination methods in case of periodic assessment during the second examination period**

Written assessment

**Examination methods in case of permanent assessment**

**Possibilities of retake in case of permanent assessment**

not applicable

**Extra information on the examination methods**

Written examination, consisting of two parts. Part 1: theoretical true-or-false questions (answer has to be motivated) and some open questions. Part 2: exercises. Use of syllabus is not allowed.

**Calculation of the examination mark**

100% written exam.