Mathematics
Pre-session course (12 hours)
Prof. Michele Longo

1. *Sets, numbers, and proofs* (C: 1.1, 1.2, 2.1; SB: App. A1, App. A3)
   1.1. Vocabulary and operations.
   1.2. Relations, functions, and correspondences.
   1.3. Real and complex numbers.
   1.4. Proofs.

2. *The space* R^N (C: 1.3; SB: 10.1-4)
   2.1. The algebraic structure of vector space. Inner products and norms on R^N. Cauchy-Schwarz inequality.
   2.2. Basic topological concepts in Euclidean spaces.
   2.3. Sequences on R^N.
   2.4. Compact and connected sets.

3. *Linear algebra essentials* (C: 1.4; SB: 13.3, 16.1-2, 23.1, 23.3-4, 27.1-6)
   3.1. Vector (linear) spaces. Linear combination. Linearly dependent and independent vectors. Basis and coordinates. Dimension.
   3.2. Linear functions. Kernel and Image of a linear application. Nonsingular linear functions. Matrix representation of a linear function.
   3.3. Eigenvalues and eigenvectors.
   3.4. Quadratic forms.

References

- Carl P. SIMON and Lawrence BLUME (SB), *Mathematics for Economists*. W.W. Norton & Company, 1994.
- Michael CARTER (C), *Foundations of Mathematical Economics*, MIT Press, 2001.