

## PHD PROGRAMME TABLE 38TH CYCLE

Section “Available Positions and Scholarships” integrated on 13/05/2022

PROGRAMME'S NAME	MATHEMATICS
DURATION	3 years
PROGRAMME START DATE	01/11/2022 (DD/MM/YYYY)
LANGUAGES	Italian, English
MANDATORY STAY ABROAD	3 months
COORDINATOR	Prof.ssa Valeria Simoncini ( <a href="mailto:valeria.simoncini@unibo.it">valeria.simoncini@unibo.it</a> )
CURRICULA	N/A
RESEARCH TOPICS	<a href="#">Detailed list at the bottom of the present document</a>
PhD POSITIONS	8
ADMISSION PROCEDURE	Qualifications evaluation Oral examination

### Available Positions and Scholarships

Pos. n.	Financial Support	Description	Positions linked to a specific research topic
1	PhD Scholarship	Totally funded by the University of Bologna general budget	
2	PhD Scholarship	Totally funded by the University of Bologna general budget	
3	PhD Scholarship	Totally funded by the University of Bologna general budget	
4	PhD Scholarship	Totally funded by the University of Bologna general budget	
5	PhD Scholarship	Totally funded by the University of Bologna general budget	
6	PhD Scholarship	Totally funded by the University of Bologna general budget	
7	PhD Scholarship	Co-funded by the University of Bologna general budget and by the Department of Mathematics	
8	PhD Scholarship	Totally funded by the University of Bologna general budget under the Progetti di Sviluppo Strategico dei Dipartimenti (PSSD) initiative	Mathematical models for life sciences, cognitive neuro-sciences, data analysis, social sciences, finance

### Admission Exams

	DATE AND TIME	RESULTS
Qualifications evaluation	Applicants' participation is not required	Available from <b>23/06/2022**</b>
Oral examination	<b>Date:</b> starting from <b>04/07/2022 – 9.00 a.m. CEST*</b> <b>Place:</b> In presence, Aula Seminario I, Department of Mathematics, Piazza di Porta San Donato 5, Bologna. Remotely, using Microsoft Teams	Available from <b>12/07/2022**</b>

\* In case that the oral examination cannot be completed in one day due to the large number of applicants, the oral examination detailed schedule shall be made available on the webpage [Studenti Online](#) together with the results of the

qualifications evaluation. **During the oral examination, applicants may express their interest in one or more positions linked to specific research topics.**

**\*\* The results of the admission exams will be available on the webpage [Studenti Online](#) (select “summary of the requests in progress” > “see detail” and open the .pdf file at the bottom of the page). No personal written communication will be sent to applicants concerning the examinations results.**

## Required and Supporting Documents to be attached to the application

All the documents listed below **shall be drawn up in English or in Italian**. In case of documents originally issued in any other language (e.g. identity document, qualifications), an official English translation is required.

Only qualifications obtained **during the last 5 calendar years** shall be taken into consideration, except for the University Degree. The Admission Board will assess the relevance of the supporting documents to the PhD Programme.

REQUIRED DOCUMENTS	
<b>Identity document</b>	Valid identity document with photo (i.e. identity card, passport)
<b>Curriculum Vitae</b>	No specific CV format is required
<b>Degrees</b>	Documents attesting the awarding of the first and second cycle degrees, the exams taken and the marks obtained (see Art. 3 of the Call for Applications)
SUPPORTING DOCUMENTS	
<b>Thesis abstract</b>	Abstract of the <b>second cycle degree thesis</b> . Graduated applicants may submit the draft of the thesis. Abstracts cannot exceed 5,000 characters, including spaces and formula possibly used. The above figure does not include: the title of the thesis, the outline, references, and images such as graphs, diagrams, tables etc.
<b>Reference letter/s</b>	<b>No more than 3 reference letters</b> signed by Italian and international academics and professionals in the research field, which do not form part of the Admission Board, attesting the suitability of the applicant and his/her interest in the scientific research. Letters shall be uploaded following the procedure on <a href="#">Studenti Online</a> , detailed in the Call for Applications (Art. 3.2).
<b>Personal Statement</b>	The statement shall include the reasons prompting the applicant to attend the PhD Programme and <b>those relevant experiences and research interests</b> , that make the applicant suitable for the specific PhD Programme (3000 characters maximum, including spaces).
<b>Publications</b>	Lists of publications (i.e. monographs, articles on scientific journals), minor publications (conference papers, etc.), abstracts and posters presented during national and international conferences, etc.
<b>Other documents</b>	<ul style="list-style-type: none"> <li>- Postgraduate vocational programmes and/or specialisation programmes relevant to the PhD Programme</li> <li>- Research activity of any kind - whether basic, applied, translational, etc. - carried out in any capacity, including when covered by research grants, and as a staff member of research projects</li> <li>- Periods of study abroad, completed by applicants outside their countries of origin (e.g. Erasmus programme or other similar mobility programmes)</li> <li>- Other qualifications attesting the suitability of the applicants (scholarships, prizes, etc.)</li> </ul>

## Evaluation criteria\*

Scores will be expressed in points out of 100, as follows.

### 1. Qualifications evaluation

Minimum score for admission to the oral examination: 30 points, Maximum score: 50 points

Passed exams, final mark and Weighted Average Mark (WAM) for the First (Bachelor's) and Second cycle degrees (Master's), in order to evaluate the applicants' whole study, general knowledge and their consistency with the PhD programme's main research topics	13 points max
Publications	2 points max
Thesis abstract	5 points max
Reference letter/s	12 points max
Curriculum Vitae, personal statement and other evaluable documents	18 points max

## 2. Oral examination

Minimum score for eligibility: 30 points, Maximum score 50 points

English language proficiency	2 points max
General knowledge of issues encompassed by the PhD Programme	48 points max

Oral examination aims to assess the suitability of the applicant for scientific research as well as the general knowledge of issues encompassed by the PhD Programme (see the list of [research topics](#) at the bottom of the present document).

**During the oral examination, the applicant's English proficiency shall be assessed.**

The oral examination is carried out in Italian or English.

\* Possible further evaluation criteria will be available on the [University website](#), selecting the relevant PhD Programme > "More information", at the bottom of the page in the section "Notices".

## Research Topics

- Commutative algebra and classical algebraic geometry
- Algebra and combinatorics
- Complex analysis
- Geometric and harmonic analysis for data analysis and machine learning
- Phase space geometric analysis of pdes
- Geometric analysis on Carnot groups
- Stochastic analysis and applications
- Applications of microlocal analysis to mathematical physics
- Stochastic optimal control
- Data science and artificial intelligence
- Didactics of mathematics
- Nonlocal equations and fractional minimal surfaces
- Quantitative finance
- Geometry of varieties
- Continuum mechanics
- Statistical mechanics and applications
- Functional analysis methods for pdes
- Optimization methods for ill-posed inverse problems in imaging
- Numerical optimization methods without derivatives
- Numerical and matrix methods for the treatment of differential problems and in data science
- Geometric modeling and processing
- Mathematical models in medicine and physiology
- Non-linear wave propagation and non-equilibrium thermodynamics
- Properties of linear and non-linear elliptic operators
- Properties of subelliptic operators
- Random fields and percolation
- Dynamical systems and applications
- Quantum information theory
- Perturbation theory and spectral analysis in quantum mechanics
- Geometric measure theory
- Spectral theory
- Geometric and computational topology