



ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA

AREA
FORMAZIONE E DOTTORATO

PHD PROGRAMME TABLE

Call for applications for the admission to the PhD programmes (41st cycle) - A.Y. 2025/2026
Second round

Section "Research Fields" modified on 05/06/2025

PROGRAMME'S NAME	DATA SCIENCE AND COMPUTATION
ASSOCIATED PARTNERS <i>Pursuant to art. 3 para 2 lett. b) of the MD n. 226/2021</i>	Istituto Italiano di Tecnologia – IIT INFN
DURATION	3 years
PROGRAMME START DATE	01/11/2025 (DD/MM/YYYY)
LANGUAGES	Italian, English
COORDINATOR	Prof. Daniele Bonacorsi (daniele.bonacorsi@unibo.it)
PHD POSITIONS	11
ADMISSION PROCEDURE	Qualifications and research proposal evaluation Oral examination

Available Positions and Scholarships

Pos. n.	Financial Support	Description	Positions linked to research topics
1	PhD Scholarship	Totally funded by the University of Bologna general budget	
2	PhD Scholarship	Funded by the University of Bologna general budget and by the Department of Computer Science and Engineering	
3	PhD Scholarship	Funded by IRCCS Istituto Ortopedico Rizzoli	Bioinformatic and genomics in musculoskeletal disorders
4	PhD Scholarship	Funded by the National Institute for Nuclear Physics – INFN	Computational Physics
5	PhD Scholarship	Funded by the National Institute for Nuclear Physics – INFN	Computational Physics
6	PhD Scholarship	Funded by Istituto Italiano di Tecnologia – IIT	Genomics and bioinformatics, medicina personalizzata e computational chemistry & physics
7	PhD Scholarship	Funded by the National Institute for Nuclear Physics – INFN	Optimization of systems enabling a distributed data lake
8	PhD Scholarship	Funded by the National Institute for Nuclear Physics – INFN	Scalable data management and analysis for high-throughput computational genomics

9	PhD Scholarship	Funded by the Department of Electrical, Electronic, and Information Engineering "Guglielmo Marconi" and by ALMA Human-Centered Artificial Intelligence	AI for sustainable and bio-inspired computing
10	PhD Scholarship	Funded by the Italian Institute of Technology – IIT	Computational approaches to understand the neural mechanisms of the brain functional connectivity
11	PhD Scholarship	Funded by TGen - The Translational Genomics Research Institute, in memory of Renzo Tomasetti. The position requires research activities to be carried out at least in part at the funding body's headquarters in the USA.	Computational modeling and algorithm development for cancer risk assessment and early detection

The yearly gross amount of the scholarships awarded for the PhD Programme in “Data Science and Computation” is €19,367.

All winners of PhD positions must fulfil the study and research obligations decided by the Academic Board, as well as the obligations set out in the relevant regulations, in the call for applications, in the funding schemes and in any agreements relating to specific positions.

Admission Exams

	DATE AND TIME	RESULTS
Qualifications and research proposal evaluation	Applicants’ participation is not required	Available from 15/07/2025
Oral examination	Date: starting from 22/07/2025 – 9.30 a.m. CEST Place: Remotely, using Microsoft Teams	Available from 20/08/2025

The results of the qualifications and research proposal evaluation, as well as the oral examination detailed schedule, shall be available on the webpage [Studenti Online](#) (select “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.

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

Required and Supporting Documents to be attached to the application

Only documents in Italian or English will be considered valid and will be assessed by the Admission Board. Identity documents and diplomas/degree certificates issued in a language other than Italian or English must be accompanied by an official translation. The translation must be carried out by an authorized body or by the awarding university. Only qualifications obtained in the last 5 years will be taken into account, with the exception of university degrees. The Admission Board will assess the relevance of the supporting documents to the PhD programme.

REQUIRED DOCUMENTS	
Identity document	Valid identity document with photo (i.e. identity card, passport)
Curriculum Vitae	The Curriculum Vitae must be drawn up using the CV form , downloadable in .docx from the University website (select the PhD Programme → “More information”, then check “Notices” at the bottom of the page). A 5 points penalty on the total qualification evaluation score shall be applied to applicants not using the above-mentioned CV form.
Degrees	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). Applicants are required to indicate the Weighted Average Mark (WAM) for each degree submitted.
Research proposal	Brief research statement (3 pages maximum in Times New Roman 11, with references including maximum 20 articles). A 5 points penalty on the total Research Statement evaluation score shall be applied to applicants exceeding the indicated maximum lengths.
SUPPORTING DOCUMENTS	

Publications	Lists of publications (i.e. monographs, articles on scientific journals), minor publications (conference papers, book's chapters etc.), abstracts and posters presented during national and international conferences, etc.
Other documents	<ul style="list-style-type: none"> - Postgraduate vocational training programmes relevant to the PhD Programme main research topics - Teaching activity carried out at university level - 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 - Work activity - Curricular or non-curricular professional internships - Other qualifications attesting the suitability of the applicants (scholarships, prizes, etc.)

Evaluation criteria*

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

1. Qualifications and research proposal evaluation

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

Qualifications evaluation	First cycle degree Weighted Average Mark (WAM) - 50% Second cycle degree Weighted Average Mark (WAM) - 50% Or Single cycle degree Weighted Average Mark (WAM) - 100% Or "Vecchio ordinamento" Italian degree (pre-1999 reform) average mark - 100% For degrees awarded abroad – CGPA - 100%	25 points max
	Publications	4 points max
	Postgraduate scholarships, research grants, research activity carried out in Universities, public or private bodies, in the last 5 years and after being awarded a second cycle degree	2 points max
	Other qualifications attesting the applicant's training and skills	3 points max
	Participation in conferences as a speaker or author/co-author of original contributions	1 points max
Research proposal evaluation	Scientific value and ground-breaking nature, structure and feasibility of the proposal (note that a 5 points penalty on the total evaluation score of this item shall be applied to applicants exceeding the maximum lengths of three pages)	15 points max

2. Oral examination

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

English language proficiency	10 points max
Research proposal presentation	15 points max
General knowledge of the PhD programme's main research topics and of the research topics linked to the available PhD positions	25 points max

Oral examination aims to assess the suitability of the applicant for scientific research as well as the general knowledge of the PhD programme's main research topics and of the research topics linked to the available PhD positions.

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

The oral examination is carried out in Italian or in English.

* Possible further evaluation criteria will be available on the [University website](#), selecting the relevant PhD Programme > "More information".

Research Fields

Pos. no. 11 with a scholarship funded by TGen - The Translational Genomics Research Institute, in memory of Renzo Tomasetti, with research topic "Computational modeling and algorithm development for cancer risk assessment and early detection"

The student will work with Prof. Cristian Tomasetti (City of Hope and TGen) as main advisor, in coordination with a co-advisor at University of Bologna, as well as with Associate Professor Sophie Penisson and Assistant Professor Kamel Lahouel in Dr. Tomasetti's Lab on projects with a focus on mathematical modeling in cancer biology. Two proposed directions are described here and several more may arise during the program.

A first line of investigation aims at the development of methods, algorithms, assays for assessing cancer risk and biological age, particularly the quantification of multicancer risk based on the accumulation of DNA mutations and its refinements through multi-omic and clinical data integration. This involves both theoretical and algorithm development with data-driven analyses, from pilot studies to population-scale datasets. Methods may include stochastic processes, latent variable models, stochastic differential equations and statistical methods.

A second direction is the development of methods, algorithms, assays for cancer early detection, by studying changes in fragmentation patterns, aneuploidy, methylation patterns and mutation in cell-free DNA. This involves, e.g., the development of a bioinformatics pipeline able to classify cancer vs healthy while handling batch effect normalization, on either whole genome sequencing data or amplicon-based approaches.