CALL FOR PHD POSITIONS – 37th CYCLE

PHD PROGRAMME IN COMPLEX SYSTEMS FOR QUANTITATIVE BIOMEDICINE

<table>
<thead>
<tr>
<th>Coordinator</th>
<th>Prof. Enzo MEDICO</th>
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<tbody>
<tr>
<td>Department</td>
<td>Oncology</td>
</tr>
<tr>
<td>Programme length</td>
<td>3 years</td>
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<tr>
<td>Programme website</td>
<td><a href="https://phd-csqb.campusnet.unito.it/do/home.pl">https://phd-csqb.campusnet.unito.it/do/home.pl</a></td>
</tr>
<tr>
<td>Programme start date</td>
<td>1st November, 2021</td>
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</tbody>
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Departments involved in the PhD Programme

- Department of Physics
- Department of Oncology
- Department of Life Science and Systems Biology
- Department of Clinical and Biological Science
- Department of Computer Science
- Department of Molecular Biotechnology and Health Science
- Department of Pharmaceutical Science and Technology
- Department of Clinical Science
- Department of Neuroscience “Rita Levi Montalcini”
- Department of Mathematics “Giuseppe Peano”, Polytechnics of Turin

Positions offered by the Programme

<table>
<thead>
<tr>
<th>n. 14 positions with scholarship, of which n. 2 reserved to candidates with international qualifications</th>
<th>of which:</th>
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</thead>
<tbody>
<tr>
<td>n. 8 scholarships funded by the University of Torino</td>
<td>- n. 1 scholarship funded by the Oncology Department</td>
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<tr>
<td>n. 1 scholarship funded by the Oncology Department on ERC funds</td>
<td>- n. 1 scholarship funded by IIGM</td>
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<tr>
<td>n. 1 scholarship funded by Fondazione Telethon</td>
<td>- n. 2 scholarships funded by Fondazione Ircs Istituto Nazionale dei Tumori di Milano</td>
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<tr>
<td>n. 1 scholarships funded by Fondazione Irccs Istituto Nazionale dei Tumori di Milano</td>
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n. 1 positions reserved to students selected within the international mobility programme:H2020-MSCA-ITN H2020-MSCA-ITN EvoGamePlus

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1 Any additional scholarships and apprenticeship contracts (Legislative Decree no. 81/2015 art.45), which may become available after the publication of this Call, will be announced on the Doctoral School website Partecipare al Bando/Submitting your application until the Call’s deadline.
# Admission Procedure

(qualifications, including research project + written exam + interview)

<table>
<thead>
<tr>
<th>Qualification</th>
<th>Max</th>
<th>Score</th>
<th>Information/Application documents</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Qualifications</strong></td>
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<tr>
<td>Final Master’s degree grade, graduates in Italy</td>
<td></td>
<td>max. 10</td>
<td><em>For those who have obtained in Italy the title of access to the Doctorate</em></td>
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<tr>
<td></td>
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<td></td>
<td>- 110-110L: 10 points</td>
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<td></td>
<td></td>
<td></td>
<td>- From 107 to 109: 8 points</td>
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<td></td>
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<td></td>
<td>- From 104 to 106: 5 points</td>
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<td>- From 100 to 103: 2 points</td>
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<td>- =&lt; to 99: 1 point</td>
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<tr>
<td>Weighted average, graduands in Italy</td>
<td></td>
<td>max. 10</td>
<td><em>For those who are going to obtain in Italy the title of access to the Doctorate</em></td>
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<td></td>
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<td>- From 108 to 110: 10 points</td>
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<td></td>
<td></td>
<td></td>
<td>- From 105 to 107: 8 points</td>
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<td></td>
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<td></td>
<td>- From 102 to 105: 6 points</td>
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<td>- From 100 to 102: 4 points</td>
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<td></td>
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<td>- =&lt; to 99: 1 point</td>
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<tr>
<td>CV, graduates and graduands in Italy</td>
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<td>max. 3</td>
<td><em>For those who have obtained/are obtaining in Italy the title of access to the Doctorate</em></td>
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<td><strong>Attach:</strong></td>
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<td>- as per the CV template</td>
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</tbody>
</table>
| CV, graduates and graduands abroad | max. 13 | For those who have obtained/are obtaining abroad the title of access to the Doctorate  
Attach:  
- as per the CV template |
|-----------------------------------|---------|--------------------------------------------------------------------------------|
| Publications: | 2       | max. 2  
Attach:  
- publications (max 2)  
- Max 1 point for each paper on journals, books or international conferences papers with review panel (max 2 publications already published will be assessed) |
| Letters of reference signed by professors or qualified researchers | 2       | 0  
Attach:  
- Letters of reference signed by professors or qualified researchers (see Art.5 of the Call for Admission) |
| Research Project | max. 5 |  
Attach:  
- Document in English, total 8000 characters including spaces, containing: (i) 4000 characters: project with state of the art, objectives, developments and expected results, bibliography; (ii) 3000 characters: a brief motivational letter; (iii) 1000 characters: summary of the Master thesis. |
| Threshold | | 10 |
| WRITTEN EXAM | max. 40 | The written test will focus on one of the research projects illustrated below in the Information sheet, chosen by the candidate, highlighting specific aspects, the details of which will be defined after a draw to be performed at the beginning of the written test for all candidates. |
Candidates will have four hours to produce the paper, which must be in English and reflect the perspective of complexity and systems biology, both from a methodological and conceptual point of view. The property of language, the scientific value of the project, the feasibility during the duration of the PhD, the expected objectives and the scientific impact of the results will be evaluated.

| Threshold to be admitted to the next examination | 20 |
| INTERVIEW | max. 40 |
| The interview will be conducted in English and will focus on the research project outlined during the written test. The candidate may optionally use a powerpoint presentation with no more than 10 slides. Time for presentation: 10 minutes. Questions and discussion: 10 minutes. |

| Threshold to pass the interview (qualified for PhD) | 20 |

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### Research topics

**PhD Programme in Complex Systems for Quantitative Biomedicine**

1) Machine learning tool for personalized medicine in Haematological Diseases  
(Tutor: Piero Fariselli, External Tutor: Gastone Castellani, Matteo Della Porta)  
Details of the project: [here](#)

2) Functional characterization of IncRNAs involved in the epigenetic regulation of neural development.  
(Tutor: Salvatore Oliviero, External Tutor: Ivan Molineris)  
Details of the project: [here](#)

3) Topic modelling analysis of Colorectal Cancer transcriptomic data  
(Tutor: Michele Caselle, co-Tutor: Enzo Medico)  
Details of the project: [here](#)
4) Crosstalk between cancer cells and microenvironment shapes tumor biology and clinical outcome of neoplastic diseases.
   (Tutor: Claudio Isella, co-Tutor: Michele Caselle)
   Details of the project: [here](#)

5) Computational modelling to integrate omics data and conventional clinic-biological parameters relevant for cancer diagnosis and prognosis.
   (Tutors: Francesca Cordero, Marco Botta)
   Details of the project: [here](#)

6) Role of gut microbiota on Peripheral Nervous System development, maintenance and regeneration
   (Tutors: Giulia Ronchi, Francesca Cordero)
   Details of the project: [here](#)

7) Topic Modelling to analyze spatial transcriptomic datasets
   (Tutor: Matteo Osella, External Tutor: Antonio Scialdone)
   Details of the project: [here](#)

8) Identification of tumor microenvironment specific molecular signatures induced by Semaphorin4D and PlexinB1 in breast and pancreatic cancer to unveil novel therapeutic targets
   (Tutor: Enrico Giraudo)
   Details of the project: [here](#)

9) In vitro models of TGF-β-induced fibrosis suitable for high-throughput screening of antifibrotic agents
   (Tutor: Dario Roccatello, External Tutor: Chary Lopez Pedrera)
   Details of the project: [here](#)

10) Determination of the accuracy and sensitivity of high performance sensors for anthropometric primary lymphedema assessment in clinical environment
    (Tutor: Dario Roccatello)
    Details of the project: [here](#)

11) Cell population dynamics in colon cancer organoids
    (Tutors: Luca Primo, Alberto Puliafito)
    Description of the project: [here](#)

12) Modelling and exploiting tumor microenvironment complexity and interaction with immune effectors in cellular immunotherapy approaches
    (Tutor: Dario Sangiolo)
    Description of the project: [here](#)

13) Alternative transcriptome in cancer
    (Tutor: Michele De Bortoli, External Tutor: Marco Beccuti)
    Description of the project: [here](#)

14) circRNAs roles and mechanisms in cancer
    (Tutor: Michele De Bortoli, External Tutors: Paolo Macchi, Valentina Miano)
    Description of the project: [here](#)

15) Analysis of the TFEB regulatory network under stress conditions related to cancer therapy
    (Tutors: Federico Bussolino, Ferdinando Di Cunto)
    Description of the project: [here](#)
16) Deciphering the molecular networks driving T cell fate decision.
(Tutor: Enzo Medico, External Tutor: Luigia Pace). (Project linked to the position with scholarship funded by IIGM)
Description of the project: here

17) Benchmarking and developing analytical tools for spatial transcriptomics.
(Tutor: Claudio Isella, External tutor: Renato Ostuni). (Project linked to the position with scholarship funded by Fondazione Telethon ).
Description of the project: here

18) Building a curated and searchable compendium of myeloid cell heterogeneity.
(Tutor: Enzo Medico, External tutor: Renato Ostuni). (Project linked to the position with scholarship funded by Fondazione Telethon ).
Description of the project: here

19) Molecular and computational characterization of genomic alterations and neoantigens in cancer cells with DNA repair deficiencies.
(Tutor: Enzo Medico, External Tutor: Alberto Bardelli). (Project linked to the position with scholarship funded by the Oncology Department)
Description of the project: here

20) Development of computational pipelines to analyse genomic and transcriptomic data from human tumours.
(Tutors: Enzo Medico, External Tutors: Federica Di Nicolantonio, Alberto Bardelli) (Project linked to the position with scholarship funded by the Oncology Department on ERC funds).
Description of the project: here

21) Development of a consensus molecular subtyping in Head and Neck Squamous Cell Carcinoma to improve prognosis and response to treatment (Tutor: Francesca Cordero, External Tutor: Loris De Cecco)
Description of the project: here