

FUTURE EARTH, CLIMATE CHANGE AND SOCIETAL CHALLENGES

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| Coordinator | Prof. Nadia Pinardi Department of Physics and Astronomy Viale Bertini Pichat 8- Bologna nadia.pinardi@unibo.it |
| Programme starting date | 01/11/2019 |
| Duration | 3 academic years |
| Language | Italian - English |
| Mandatory mobility abroad | Yes (3 months) |

Research topics

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| A. The earth system | <ul style="list-style-type: none"> - Solid earth physics - Observations of the atmosphere, oceans and ecosystems - Climate variations and modeling - Atmospheric and ocean predictions - Water and hydrology - Carbon cycle and biogeochemical cycles - Paleoclimate - Hazard mapping and extreme events |
| B. Impacts, adaptation and vulnerability | <ul style="list-style-type: none"> - The role of humans in managing resources and the societal impacts of climate change - Food production and security - Water resources and security - Biodiversity, environment and nature conservation - Human Health and Well-Being - Economics of adaptation - Resilient agriculture - Cultural heritage conservation - Recovery and reuse of materials |
| C. Technological innovations for a decarbonized society | <ul style="list-style-type: none"> - The mitigation and adaptation technological developments required by the industrial sectors - Energy and environmental efficient systems - Renewable energy systems and products - Green/blue/hybrid architecture - Smart grids and positive energy districts - Transport innovation - Low carbon technologies - Sustainable chemistry and engineering - Industrial and Urban Symbiosis |
| D. Socio-economic and legal studies for mitigation of climate change | <ul style="list-style-type: none"> - The effects of mitigation policies on economic growth and government/rulemaking - Social, Economic, and Ethical Concepts and Methods - Sustainable Development and Equity - International Cooperation - Regional Development and Cooperation - Cross-cutting Investment and Finance issues - Environmental law - Circular economy - Communicating Climate Change |

Positions and scholarships

| Position n. | Financial support | Description | Positions linked to research subjects |
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| 1 | PhD Scholarship | Totally funded by the University of Bologna general budget | Physics of the Solid Earth |
| 2 | PhD Scholarship | Totally funded by the University of Bologna general budget | Dynamics of flow circulation during drought conditions using numerical and experimental approaches |
| 3 | PhD Scholarship | Totally funded by the University of Bologna general budget | Oceanography: interdisciplinary modelling and climate processes |
| 4 | PhD Scholarship | financed by the Department of Physics and Astronomy, partly with resources from an agreement with Arpa and partly under the H2020 Operandum Project | Reconstructions of the climate over Italy by high resolution numerical model and observations |
| 5 | PhD Scholarship | funded by the Euro-Mediterranean Centre for Climate Change Foundation (CMCC) - The | Advanced coastal modeling and data assimilation |

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| | | applicant awarded this scholarship is expected to carry out part of his/her activity at the CMCC headquarters in Lecce. | |
| 6 | PhD Scholarship | funded by the Euro-Mediterranean Centre for Climate Change Foundation (CMCC) | Coupled atmosphere-ocean model forecasts in the Mediterranean area |
| 7 | PhD Scholarship | Totally funded by the University of Bologna general budget | Climate Change and Societal Challenges: Policies, Communication and Risk Management |
| 8 | PhD Scholarship | funded by the Toso Montanari Department of Industrial Chemistry. | Developments through 3D technology of new flow microbial bio-fuel cells powered by agro-industrial waste materials for electric mobility |
| 9 | PhD Scholarship | fully financed from the central budget under the Departmental Strategic Development Projects (DSP) | Regional sea level assessment and impacts for the coastal region of Emilia-Romagna |
| 10 | PhD Scholarship | partly financed from the central budget and co-financed by the MIUR under the "Departments of Excellence" initiative | Climate change impact on Infrastructures and adaptation technologies |
| 11 | PhD Scholarship | partly financed from the central budget and co-financed by the Department of Industrial Engineering | Low carbon systems for climate change mitigation and adaptation |
| 12 | PhD Scholarship | funded by the National Research Council - Institute of Atmospheric and Climate Science (ISAC - CNR) based in Bologna | Radiative transfer methods to investigate the variability of atmospheric climate forcing agents |
| 13 | PhD Scholarship | funded by the National Research Council - Institute of Atmospheric and Climate Science (ISAC - CNR) based in Bologna | Communication strategies in the field of Global Change and its impacts |
| 14 | PhD Scholarship | financed by the Department of Physics and Astronomy with resources from an agreement with the National Research Council –Institute of Applied Physics "Nello Carrara" based in Florence (IFAC - CNR) and with the European Space Agency - European Space Research Institute (ESA - ESRIN). | Retrieval of geophysical variables from atmospheric spectral radiance measurements in the mid and far-infrared and their interpretation through chemical and atmospheric transport models |
| 15 | PhD Scholarship | funded under the three-year High Competence Plan for research, technology transfer and entrepreneurship (POR FSE funds – Resolution n. 462 of 25/03/2019). The assignment of this scholarship is subject to the declaration of residence or domicile of the scholarship holder in Emilia-Romagna. | Machine learning for the development of climate change impact models |
| 16 | PhD Scholarship | financed by Istituto Nazionale di Geofisica e Vulcanologia (INGV) | Quantification of uncertainty in local tsunami models in the context of multi-hazard and multi-risk applications |
| 17 | PhD Scholarship | funded by the Euro-Mediterranean Centre for Climate Change Foundation (CMCC) | Raising operational efficiency of shipping via meteo-oceanographic information |
| 18 | PhD Scholarship | funded by the Department of Chemistry within the ERC Project "RESOLUTION" | Radiocarbon chronologies of glacial trees from sites in Mediterranean and southeast Europe |
| 19 | PhD Scholarship | funded by N.A.T.O. CMRE - Science and Technology Organization Centre for Maritime Research and Experimentation | Ocean small scale high frequency dynamics: modelling and observation |

Positions linked to specific research subjects: during the oral test, applicants may express their interest in one or more positions linked to specific research subjects. Considering the expressions of interest above, the Admission Board shall express its view on the suitability of the interested applicants, taking into account their specific skills, experience and aptitude.

Admission requirements

Please, see art. 2 of the Call for applications

Mandatory documents to be attached to the application

Please, see art. 3 of the Call for applications

Further qualifications that may be attached to the application, if in possession of the applicant (only qualifications attested by documents drawn up in Italian, English, French, German and Spanish shall be considered as valid and assessed by the Admission Board)

- Abstract of the second cycle master's degree thesis. Undergraduate applicants may submit the draft of the thesis approved by their supervisor (please, note that abstracts cannot exceed 5.000 characters, including spaces and formula possibly used. The above figure does not include: the title of thesis, the outline, and images such as graphs, diagrams, tables etc. - where present);
- No more than 2 reference letters signed by 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 for the scientific research.
Please, note that the above letters cannot be uploaded by applicants. When filling the online application form on <http://studenti.unibo.it>, applicants will be only allowed to provide the email accounts of the requested academic/professional. The latter shall receive an email from the University of Bologna providing for the instructions for uploading. Only letters in pdf format submitted before the expiry date and time of the Call shall be accepted.
- Multi-annual research project, with special emphasis on the activities to be completed during the first-year course. The proposal must meet the following requirements:
 - o It must indicate in the cover page the topic of the research project proposal and for which the applicant is applying
 - o It cannot exceed 20.000 characters, including spaces and formula possibly used. This figure does not include: the title of project, the outline, references and images (such as graphs, diagrams, tables etc - where present);
 - o It must include: the state of the art; description of the project; expected results; lead-time for implementation; (proposed) criteria to be used to assess the findings obtained; references.

The research projects that successful applicants shall carry out during their doctoral career may possibly differ from the project proposed at the application stage. This shall be defined together with the supervisor and approved by the Academic Board.
- Motivation letter. This must include the reasons prompting the applicant to attend the PhD Programme and those relevant experiences and research interests, that make the applicant suitable for the specific PhD Programme (3000 characters maximum, including spaces)
- List of the publications (monographs, articles published on scientific journals, volume's chapters).
- List of the minor publications (conference papers, etc.)
- List of abstracts and posters at national and international congresses,
- Professional Master courses relevant to the PhD Programme.
- Postgraduate vocational training programmes/specialisation programmes relevant to the PhD Programme.
- Thesis of specialization
- 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
- Working activity
- Vocational internships
- Curricular and non-curricular training and guidance internships
- Documents attesting the knowledge of foreign languages
- Study periods completed abroad (e.g. Erasmus programme or other similar mobility programmes).
- Other qualifications attesting the suitability of the applicants (scholarships, prizes, etc).

Admission exams (art. 4 of the call for applications)

| Examination type | Schedule (please, note that applicants shall not receive any communication concerning the exams schedule) | Examination results publication (please, note that applicants shall not receive any communication concerning the publication of results) |
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| Qualifications and research project evaluation | Non-presential. | The results of the qualifications and research project evaluation shall be available online starting from the 10/06/2019 at the page http://studenti.unibo.it (please, select "summary of the requests in progress" - "see detail" and open the pdf file "risultati valutazione titoli e progetto") |
| Oral examination | Date | 03/07/2019 In case that the oral examination cannot be completed in one day due to the large number of applicants, the oral exam schedule shall be made available at the webpage http://studenti.unibo.it together with the results of the qualifications and research project evaluation |
| | Place | Bologna - Viale Berti Pichat 6/2 Department of Physics and Astronomy Biblioteca di Geofisica |
| | Time | 10:00 am Central European |
| The results of the oral examination shall be available on the webpage http://studenti.unibo.it starting from 05/07/2019 (please, select "summary of the requests in progress" - "see detail" and open the pdf file "risultati prova orale") | | |

Applicants can ask to take the exam remotely using Skype. For further details please refer to the relevant provision laid down in art. 4 of the Call for applications.

Evaluation criteria

Points will be allocated to applications out of a total of 100 on the basis of the following weighting:

1. Qualifications and research project

- Minimum for admission to the oral exam: 30 points
- Maximum: 50 points

Only qualifications relating to the last 5 calendar years prior to the calendar year of publication of the Call for applications shall be taken into consideration, with the exception of the University Degree (Diploma di laurea). Please, note that qualifications must be consistent with the PhD Programme.

Points relating to qualifications shall be allocated on the basis of the following criteria:

- Graduation final mark. Undergraduates shall be evaluated on the basis of the Weighted Average Mark (WAM): max 5 points
- Master's degree thesis abstract: max 5 points
- Reference Letters: max 8 points
- Publications: max 3 points
- Motivation Letter: max 5 points
- Documents attesting the knowledge of foreign languages and periods spent abroad for study purposes (e.g. Erasmus, etc.): max 3 points
- Specializations: max 5 points
- Teaching activity carried out at a University level at both private and public bodies, in Italy or abroad; research activity of any kind; working activity; vocational training; Curricular and non-curricular training and guidance internship: max 4 points
- Research project: max 10 points
- Other qualifications: max 2 points

2. Oral examination

- Minimum for inclusion in the final ranking list :30 points
- Maximum: 50 points

Oral examination includes the presentation of the research project and is intended to assess the suitability of the applicant in respect of the pursuing of scientific research as well as the general knowledge of issues connected to the PhD Programme. During the oral examination, knowledge of English language shall be assessed.

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

Points relating to the oral examination shall be allocated on the basis of the following criteria:

- knowledge of the English language: max 5 points
- general knowledge of issues connected to the PhD Programme: max 45 points

Possible evaluation sub-criteria will be available on the [Unibo website](#), selecting the relevant PhD Programme → "PhD programme information" at the bottom of the page in the section "Notices".

Final ranking list and enrolment (arts.6 and 7 of the Call for applications)

After the publication of the results of the oral exam, the final ranking list will be available on the [Unibo website](#), selecting the relevant PhD Programme → "PhD programme information" at the bottom of the page in the section "Notices".

Following the publication of the final ranking list, successful applicants must enroll on <http://studenti.unibo.it> by the deadline indicated on the [Unibo website](#), selecting the relevant PhD Programme → "PhD programme information".