**ANNEX 9**

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| **ID NUMBER** | MOSES_09 |
| **PHD TITLE** | **MOLECULAR SCIENCES FOR EARTH AND SPACE** |
| **AVAILABLE POSITIONS** | 1 SSM Doctoral Fellowship |
| | 6 PNRR Doctoral Fellowships (on research themes relevant for the PNRR) |
| | 1 PNRR Doctoral Fellowship – Public Administration (on research themes relevant for the specific PNRR subprogram) |
| **PHD AND SELECTION FEATURES** | The Ph.D. program in Molecular Sciences for Earth and Space includes a 4 years long period of study and research activity; it is intended for strongly motivated students who are interested in developing original approaches for research activity in the following areas: (i) Spectroscopy and Chemical Kinetics, (ii) Astrochemistry and Astrobiology; (iii) Theoretical and Computational Chemistry, (iv) Chemistry of the atmosphere and the environment; (v) Photo-induced and far from equilibrium processes.<br><br>The Ph.D. program can be characterized by a strong multidisciplinary approach, focused on the application of experimental and/or computational techniques to the study of topics in astrochemistry, chemistry of the atmosphere, and more in general to the study at molecular level of complex reactive and spectroscopic phenomena, including photo-induced processes, both at the thermodynamical equilibrium and far from equilibrium. Theoretical methods can refer to quantum mechanical modeling (including computational spectroscopy, molecular and electronic dynamics), to the data science and artificial intelligence.<br><br>The competition is open to those in possession of a master's degree or equivalent qualification. The admission to the Ph.D. program is granted after passing a public competition based on **qualifications, presentation of a scientific report and an oral exam**.<br><br>The examination is based on the evaluation by the review board, of qualifications, the scientific report on the topics of the Ph.D. program (max 60 points), and the final oral exam in English (max 40 points). A short list of applicants, admitted to the final oral exam, will be published in advance. |
| **DESCRIPTION OF THE INVESTIGATION LINES OF THE DOCTORAL PROGRAM** | The Ph.D. program, jointly offered with the University Federico II and Scuola Normale Superiore, aims to provide the critical tools to understand several aspects of Molecular Sciences. Relevant topics are: the processes of molecule formation in space and the conversion and evolution of molecules towards complex systems, the interaction of electromagnetic radiation with matter and how the collected data can provide a direct knowledge of Earth's atmosphere and space; the chemical reactivity in the Earth's atmosphere, biochemical and biological processes, also taking into account the atmospheric pollution.<br><br>Thus, the main Ph.D. program topics are:<br><br>-experimental and theoretical studies, ranging from organic synthesis to spectroscopy, from chemical reactivity to photochemistry, to biochemistry, including both equilibrium and far from equilibrium processes;<br><br>- observations and modeling of data in astrochemistry and chemistry of atmosphere, ranging from the identification of molecules in the interstellar medium to the characterization of the atmospheres of planets and pollutants in the Earth's atmosphere. |

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| | During the first year of the course the students will select the laboratory and the topic on which they intend to conduct their research.<br><br>Recipients of PNRR-funded scholarships are expected to be involved in a research topic aligned with themes in the areas of interest of the PNRR (https://www.governo.it/sites/governo.it/files/PNRR.pdf). These topics focus on the development of knowledge, including applied knowledge, in complex model systems. |
| **SCIENTIFIC COORDINATOR** | Prof. Nadia Rega |
| **SCIENTIFIC REPORT TO BE ATTACHED TO THE APPLICATION** | Scientific project in English (max. 2,500 words/15,000 characters, short bibliography included) with a description of the topic of the master's thesis or a scientific topic addressed subsequently by the candidate in the course of his/her experience, divided into sections illustrating the state of the art, objectives, results obtained, methodology used, and possible future developments. |
| **COURSE LENGTH IN YEARS** | 4 Years |
| **ANNUAL GROSS AMOUNT OF THE SCHOLARSHIP, NET OF THE CHARGES BORNE BY THE UNIVERSITY** | € 19,000 + 50% increase of the monthly installment of the fellowship for stays abroad (for a maximum of 12 monthly installments) |
| **RESEARCH BUDGET** | 10% of the fellowship in the first year, 20% of the fellowship in the three following years. |
| **E-MAIL ADDRESS FOR INFORMATION** | moses@ssmeridionale.it |
| **PROGRAM'S WEBPAGE** | https://www.ssmeridionale.it/en-us/dottorato/rubriche/molecular-sciences-for-earth-and-space-moses-3124-1-de9ddf8b311e702b478d6a39e4d99c53 |
| **WEBPAGE FOR INFORMATION AND NOTIFICATIONS TO CANDIDATES** | https://www.ssmeridionale.it/it-it/la-scuola/bandi-di-concorso/dottorati |