

ANNEX A-1

University of Genova – Italian Institute of Technology
Doctoral School on “*Life and Humanoid Technologies*”

Academic Year 2011-2012

Doctoral Course on

“*Drug Discovery*”

Research Themes

10 positions available with scholarship

RESEARCH THEMES

The themes of the Doctoral Course on Drug Discovery have been defined by the Research Director (Prof. Daniele Piomelli) and Senior Scientists as follows:

Theme 1: Pharmacology

Theme 2: Medicinal Chemistry

Theme 3: Computational Chemistry

The candidates are asked to prepare a research project of their choice with explicit reference to the Theme proposed. The soundness of the project will be part of the evaluation process and will be considered preferential for the choice of the individual scientific theme that will be made jointly by the tutor and the candidate.

Each application must make specific reference to one of the research themes proposed.

Theme 1 - Pharmacology

Tutors: Dr. Angelo Reggiani – Prof. Mario Marchi – Prof.ssa Adriana Maggi – Prof. Antonio Calignano – Prof. Daniele Piomelli – Prof. Stefano Sensi

N. available positions: 4

Pharmacology applied to drug discovery has to provide the biological rationale and the enabling technologies to implement effective target selection and validation studies, to develop the suitable screening assays for new molecules and to profile up newly identified lead candidate/s.

The candidate should describe a pharmacology-based research project related to one of the following topics:

- Boosting the endocannabinoid system as a way to identify novel analgesics and anti-inflammatory drugs;
- Nicotinic receptor subtypes in smoking cessation;
- New drug targets in Alzheimer's disease;
- Innovative tools for the rapid spatio-temporal study of drug efficacy;

For further details concerning the research project, please contact: angelo.reggiani@iit.it

Theme 2 - Medicinal Chemistry

Tutors: Dr. Tiziano Bandiera – Prof. Paolo Grieco – Prof.ssa Maria Laura Bolognesi – Prof.ssa Renata Riva – Prof. Angelo Ranise

N. available positions: 4

The synthesis of novel, drug-like compounds is central to the advancement of any drug discovery program. Recent developments in synthetic methodologies offer a variety of approaches to rapidly construct drug-like molecules to be screened against the targets of interest for the identification of promising hits or lead compounds. A research project proposal should be prepared in one of the following topics:

- Synthetic approaches to the construction of a small collection of compounds for screening purposes endowed with drug-like properties and high chemical diversity;
- Enzyme inhibitors as drug candidates for the treatment of pain, inflammation, and/or neurodegenerative diseases.

For further details concerning the research project, please contact: tiziano.bandiera@iit.it

Theme 3 - Computational Chemistry

Tutor: Dr. Andrea Cavalli

N. available positions: 2

Computational methods are nowadays widely applied to help design molecules of pharmaceutical relevance. They range from conventional algorithms such as protein-ligand docking and virtual screening simulations to more innovative approaches such as enhanced sampling techniques, de novo design and protein-protein docking.

The candidate should describe a research project devoted to the use of computational chemistry in drug discovery and related to one of the following topics:

- discovery of kinases inhibitors with particular regard to selectivity and protein flexibility;
- study of reaction mechanisms of targets of pharmacological interest by means of quantum chemical calculations;
- study and development of Statistical Pattern Recognition techniques for the analysis of bioinformatic data (in collaboration with PLUS lab – Computer Imaging of IIT).

For further details concerning the research project, please contact: andrea.cavalli@iit.it