UNIVERSITY OF BASILICATA
Department of Basic and Applied Sciences

Availability of Internship Position for Hosting ERASMUS Students

LIFE SCIENCES

CHEMISTRY FOR THE INNOVATION AND SUSTAINABLE DEVELOPMENT

GEOSCIENCES

MATHEMATICS

LABORATORY NAME: INSECT PHYSIOLOGY AND MOLECULAR BIOLOGY LABORATORY

RESEARCH TOPIC: The research mainly focuses on insect biotechnology and its applications, with particular interest in:
- The molecular mechanisms regulating insect behavior, biology, and physiology, including their interactions with other organisms
-Insects as sources of genes, bioactive molecules, and biological processes useful for human applications

Principal Investigator:
NAME: PROF. PATRIZIA FALABELLA

EMAIL: patrizia.falabella@unibas.it

OTHER INFORMATION (SCOPUS, ORCID):
Scopus ID: 6603490426- ORCID 0000-0003-0304-6867

RESEARCH OBJECTIVES
- Investigate the molecular and functional mechanisms involved in host–parasitoid interactions;
- Study the role of polydnaviruses in pathologies of parasitized insects;
- Identification of parasitoid virulence genes for potential application in the development of biological insecticides;
- Study of insect olfactory perception and development of nanobiosensors;
- Use of insects as model organisms for studying conserved biochemical and molecular pathways;
- Study of bioconversion of agri-food by-products through insects (e.g., Hermetia illucens) to to transform agri-food by-products into valuable biomolecules (lipids, proteins, chitin, antimicrobial peptides).

TECHNOLOGICAL OFFER
The laboratory is equipped with all the necessary facilities for conducting molecular biology, biochemistry, and entomological studies.

LABORATORY NAME: APPLIED BIOLOGY AND IMMUNOMETABOLISM

RESEARCH TOPIC: Immunometabolism – epigenetics- cell signaling

Principal Investigator:
Vittoria Infantino, Simona Todisco

NAME: Vittoria Infantino

EMAIL: vittoria.infantino@unibas.it

OTHER INFORMATION:
Scopus Author Identifier : 9241758200. https://www.scopus.com/authid/detail.uri?authorId=9241758200
ORCID: https://orcid.org/0000-0002-8509-5218

RESEARCH OBJECTIVES

- **Interplay between metabolism and gene expression during cell differentiation and in physiological and pathological conditions**
- **Dysregulation of cell signaling in the inflammatory response and tumor progression**
- **Investigation of immunometabolism as a potential source of novel diagnostic biomarkers and therapeutic targets**

TECHNOLOGICAL OFFER
ELISA assays, Western blotting, Real-time PCR, Evaluation of Enzymatic Activity, Chromatin Immunoprecipitation (ChIP and Re-ChIP), 2D and 3D cell cultures, *In silico* sequence analysis, Co-Immunoprecipitation (Co-IP), Immunocytochemistry.

LABORATORY NAME: STRUCTURAL BIOCHEMISTRY AND IMMUNOLOGY

RESEARCH TOPIC: Bioenergetics -Immunometabolism

Principal Investigator:

Simona Todisco, Vittoria Infantino

NAME: Simona Todisco

EMAIL: simona.todisco@unibas.it

OTHER INFORMATION:

Scopus Author Identifier : www.scopus.com/authid/detail.uri?authorId=57224847351

ORCID: 0000-0001-7837-7412

RESEARCH OBJECTIVES

- **Metabolic enzymes as cellular targets and their inhibition in inflammatory conditions.**
- **Mitochondrial bioenergetics in physiological and pathological conditions;**
- **Metabolic enzymes as cellular targets: their role and inhibition in inflammatory conditions;**
- **Mitochondrial bioenergetics in physiological and pathological conditions.**

TECHNOLOGICAL OFFER
Electrophoresis, Western blotting, Enzymatic Activity Assay, Quantification of Inflammatory mediators, Enzymatic inhibition assay, Computational analysis of protein sequences, Measurement of biomarkers associated with oxidative stress.

LABORATORY NAME: Bioinorganic Laboratory

RESEARCH TOPIC: Development of proteins for diagnostic use by recombinant DNA technology

PRINCIPAL INVESTIGATOR:

NAME: Angela Ostuni (professor of Biochemistry)

EMAIL: angela.ostuni@unibas.it

OTHER INFORMATION
Scopus Author Identifier: https://www.scopus.com/authid/detail.uri?authorId=8530199000
ORCID ID: 0000-0001-5970-5097

RESEARCH OBJECTIVES
Production, purification and immunochemical characterization of recombinant protein

TECHNOLOGICAL OFFER
transformation of bacteria; expression of recombinant proteins by Escherichia coli strains using inducible expression systems; protein purification using chromatography techniques (e.g., His-tag/Ni-NTA purification, HPLC); protein analysis via SDS-PAGE and Western blotting; ELISA test.

As part of this experience, students will be encouraged to critically evaluate the results and will acquire the ability to write a scientific-technical report.

LABORATORY NAME: LABORATORY OF ANALYTICAL CHEMISTRY, LABORATORY OF MASS SPECTROMETRY, LABORATORY OF HPLC AND MASS SPECTROMETRY.

RESEARCH TOPIC: Untargeted Metabolomics Using High-Resolution Mass Spectrometry (HRMS) in Food and Plant Matrices

Principal Investigator:
Giuliana Bianco, Angela Di Capua

NAME: Giuliana Bianco, Angela Di Capua

EMAIL:

giuliana.bianco@unibas.it,

angela.dicapua@unibas.it

OTHER INFORMATION (SCOPUS, ORCID):

Giuliana Bianco Scopus ID: 7005734105

Angela Di Capua Scopus ID: 55363554500

RESEARCH OBJECTIVES

• Our research focuses on developing innovative analytical methods based on high-resolution mass spectrometry (HRMS) for the detection of natural and synthetic compounds in food matrices, with the aim of assessing the quality of raw materials.

TECHNOLOGICAL OFFER

LTQ- orbitrap Mass spectrometry coupled with liquid chromatography for targeted and untargeted studies of different class of compounds.

LABORATORY NAME: BIOLOGICALLY ACTIVE ORGANIC COMPOUNDS "CARLO CESARE BONINI"

RESEARCH TOPIC: Synthesis of natural or/and not organic compounds possessing biological activity

Principal Investigator: Lucia Chiummiento, Alessandro Santarsiere, Pierantonio Galgano

NAME: Lucia Chiummiento

EMAIL: lucia.chiummiento@unibas.it

Scopus Author ID: 6603299849

Orcid: ID: 0000-0001-8181-9138

RESEARCH OBJECTIVES

- Sustainable synthesis of resveratrol dimers and analogues benzofuryl containing moiety as new antitumoral compounds.
- Asymmetric synthesis of unconventional aminoalcohols for the preparations of new peptidomimetics
- Green methodologies in cross-coupling reactions.

TECHNOLOGICAL OFFER
During the internship period students will face the common procedures used in an organic laboratory.

They will be confident with

- the **drying** techniques of solvents as dichloromethane, THF, diethyl ether;
- the **quenching** and **the working-up** of the reaction mixture;
- the **purification** methodologies as the crystallization and the TLC and column chromatography;
- the **analyzing** of NMR (1H and 13C) and GC-mass spectra.

LABORATORY NAME: Physical Chemistry Laser Laboratory

RESEARCH TOPIC: The research activities are focused on the laser assisted synthesis of nanostructured functional materials by means of Pulsed Laser Deposition (PLD) and Pulsed Laser Ablation in Liquid (PLAL) techniques. Spectroscopic and microscopic techniques will be used for the physico-chemical characterization of the synthesized materials.

Principal Investigator:

NAME: Angela De Bonis

EMAIL: angela.debonis@unibas.it

OTHER INFORMATION (SCOPUS, ORCID):

Scopus Author Identifier: 55921743400

ORCID: 000-0002-1177-2896

RESEARCH OBJECTIVES

- Nanosecond Pulsed Laser Deposition of glass-ceramic materials for biomedical applications
- Pulsed Laser Ablation in Liquid of metals and oxides with photocatalytic and antioxidant capability

TECHNOLOGICAL OFFER

- Nanosecond and femtosecond laser sources
- Fully equipped chemistry laboratory
- Spectroscopic (such as Uv-Vis, FTIR, ATR-IR and micro Raman) and microscopic techniques (AFM, SEM-EDS, HR-TEM) are available

UNIVERSITY OF BASILICATA
Department of Basic and Applied Sciences

LABORATORY NAME: COMPUTATIONAL PHYSICAL CHEMISTRY

RESEARCH TOPIC: Ab initio electronic structure of semiconductor, oxides and relevant interfaces for photovoltaics and photocatalytic applications; Electron transfer theory in condensed media.

Principal Investigator: Dr. Francesco Ambrosio

NAME: Francesco Ambrosio

EMAIL: francesco.ambrosio@unibas.it

OTHER INFORMATION:

https://scholar.google.com/citations?user=ikBvQl0AAAAJ&hl=en

ORCID:

0000-0002-6388-9586

RESEARCH OBJECTIVES

- Electron transfer in condensed matter combining electronic-structure calculation and theoretical modelling at the quantistic level
- Electronic structure and charge localization in semiconductors and oxide including but not limited to organic semiconductors and metal halide perovskites.
- Defect chemistry of materials for different applications

TECHNOLOGICAL OFFER
• Learn how to use (and modify) suites of programs for electronic structure calculations, learn how to develop and test a theoretical model

LABORATORY NAME: **LABORATORY OF SEDIMENTOLOGY**

RESEARCH TOPIC: Tidal straits: their sedimentary dynamics in modern environments and their signature in the rock record

Principal Investigator

NAME: Sergio G. Longhitano

EMAIL: sergio.longhitano@unibas.it

OTHER INFORMATION (SCOPUS, ORCID): 0000-0003-4978-4582

Scopus Author Identifier: 55908857700

RESEARCH OBJECTIVES

• Multiple research topics can be listed. For each research topic, you can indicate max two lines to present the purpose.

• Oceanographic modelling of ancient tidal straits by using modern case studies andapplying specific algorithms for the reconstruction of the paleoflow patterns.

• Isotopic signature of the Mediterranean ancient tidal straits: do they responded to specific climatic forcing?

• Supercritical-flow structures as the precursor element for the catastrophic opening of ancient straits: outcrop section analysis and comparison with modern analogues.

TECHNOLOGICAL OFFER

• Techniques used, studies, analyses, or other activities proposed to the student during the internship period. Max four line

• Stratigraphic and sedimentological, field-based analysis;

• Drone photogrammetry and 3D modelling;

• Isotopic analysis (C & O) of carbonate matter dissolved in the strait-fill lithofacies;

• 2D modelling of paleo-oceanographic reconstructions.

UNIVERSITY OF BASILICATA
Department of Basic and Applied Sciences

RESEARCH TOPIC:

Approximation by polynomials, Lagrange interpolation, Linear operator, Approximation of integral transforms, Fredholm and Volterra integral equations.

Principal Investigator:

NAME: Donatella Occorsio

EMAIL: donatella.occorsio@unibas.it

OTHER INFORMATION (SCOPUS, ORCID):

Scopus Author Identifier : 56022275300

ORCID: 0000-0001-9446-4452

RESEARCH OBJECTIVES

• Approximation of singular and hypersingular integral operators from the theoretical point of view, and quadrature formulas implemented in Matlab.

TECHNOLOGICAL OFFER
The student will be introduced to techniques in numerical analysis, related to the topic, included elements of approximation theory. Activities will include studying relevant literature and applying specific methods to the chosen topic.

University of Basilicata
Department of Basic and Applied Sciences

RESEARCH TOPIC:

Operator Theory and Evolution Equations (Positive operators, semigroups of operators, differential operators and applications to evolution equations). Approximation Theory (positive approximation processes, approximation of semigroups by means of positive operators). Potential Theory (integral representation of solutions to BVPs associated with linear elliptic PDEs, boundary integral equations).

Principal Investigator:

NAME: Vita Leonessa

EMAIL: vita.leonessa@unibas.it

OTHER INFORMATION (SCOPUS, ORCID):

Scopus Author Identifier : 22835826600

ORCID: 0000-0001-9547-8397

RESEARCH OBJECTIVES

- Positive approximation processes in Lebesgue spaces.
- Integral representations for solutions of some BVPs for elliptic PDEs.

TECHNOLOGICAL OFFER

The student will be introduced to basic techniques in real analysis, functional analysis, and either approximation theory or potential theory. Activities will include studying relevant literature, analyzing operator properties, and applying specific methods to the chosen topic.

RESEARCH TOPIC:

Numerical solution of Volterra integral equations arising in the applications

Principal Investigator:

NAME: Maria Carmela De Bonis

EMAIL: mariacarmela.debonis@unibas.it

OTHER INFORMATION (SCOPUS, ORCID):

Scopus Author Identifier: 7005042734

ORCID: 0000-0002-0173-5848

RESEARCH OBJECTIVES

• The study of the solvability of the Volterra integral equation from the theoretical point of view

• The study of the classical numerical methods available in the literature

• Choosing the most appropriate numerical method for solving the Volterra integral equation of interest

• Implementation of the numerical method in MatLab

• Numerical tests

TECHNOLOGICAL OFFER

To achieve the research objectives the student will have to study basic and advanced elements of approximation theory and functional analysis, as well as procedural programming in MatLab.