



# Mauricio Esguerra

COMPUTATIONAL CHEMIST

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## Profile

Experienced researcher with an international background in Sweden, the United States and Colombia. Highly skilled in Structural Molecular Biology, Scientific Programming, Bioinformatics, Biopolymers, and project management of research projects. PhD focused in RNA Structure and Bioinformatics from Rutgers, The State University of New Jersey. Expert knowledge on G-Protein Coupled Receptors (GPCR's), RNA, the Ribosome, tRNA modifications, and antigene technology via triple helical DNA modifications.

“...he managed the project and revealed himself as an excellent team-worker and project coordinator. He showed independence, creativity, critical thinking and a particularly methodical work-style, which I can say was key for the success of the project. ”

**Hugo Gutiérrez de Terán**

*Associate Professor, UU*

“I can recommend Mauricio for his excellent attitude towards science, his constant and contagious interest for cutting edge developments in computational chemistry, biology, and science in general, his ability to work both independently and with colleagues, and his fast learning skills”

**David van der Spoel**

*Head of ICM Department, UU*

## Career Goal

I am passionate from top to bottom about science and well trained on learning and appropriating complex scientific topics fast and deeply. One of my main goals is to continue my ongoing passion for science whether in new technical areas such as Machine Learning (Deep learning or A.I.) or Data Science, and/or areas of biological and medical relevance, such as the development, understanding and promotion of new medicines.

I have a laid back attitude when interacting with others and know when to and how to react wisely to personal cues with a warm and positive attitude. I have a continued interest in pharmaceutical sciences coming from the principles of my RNA and GPCR research which can be linked to understanding better and better how to treat disease with engineered small molecules, nucleotides or peptides. I'm an avid English reader and enjoy writing and editing. I like being involved with people and intellectual discussion, solving problems and discussing them thoroughly, and learning from colleagues, which is one of the ingredients I've been lucky to have throughout my career and want to keep and reinforce.

## Professional Experience



UPPSALA  
UNIVERSITET

### Uppsala University

Researcher

*Uppsala, Sweden*

*Apr. 2015 - Feb. 2019*

- Main focus has been research on the effect of tRNA modifications on initial selection in protein translation.
- Have deployed a ROCKS cluster for the department and helped on its maintenance.
- Constant interaction, project management and collaboration with graduate students.



UPPSALA  
UNIVERSITET

### Uppsala University

Carl Tryggers Fellow

*Uppsala, Sweden*

*Apr. 2013 - Apr. 2015*

- Developed a python module for automatic recognition of Ballesteros-Weinstein pairs in GPCR's structures which are used to improve molecular dynamics simulations.
- GPCR webserver full update with the django web framework, full-stack development of front-end and back-end.
- Development of **Q**, creation of github organization, and documentation writing.
- Study of the catalytic mechanisms of  $\beta$ -phosphoglucosyltransferase using the Empirical Valence Bond method and the Molaris software.



### Karolinska Institute

Post-doctoral Fellow

Huddinge, Sweden

Oct. 2010 - Apr. 2013

- Worked on analysis of the sequence dependence of helical deformation in a classical parallel triplex.
- Worked on the effect of the sugar modification called LNA in the mechanical properties of the antiparallel triplex, finding that the final effect is that of a concerted increase in the major and minor grooves of B-type DNA.
- Lectured on the principles of nucleic acid structure as understood with Calladine-Drew mechanical rigid-body parameters, and the basic Tinoco-Uhlenbeck based Nussinov algorithm for secondary structure folding predictions of RNA.



### Rutgers University

Teaching Assistant in various chemistry courses

N. B., New Jersey, U.S.A

2003 - 2009

- Problem solving sessions.
- Office hours for students.
- Grading.



### Universidad de los Andes

Course instructor in physics for pre-freshman students

Bogotá, Colombia

2002, 2003

- Developed experiments and wrote guides.
- Taught the course.

### Alvaro Castellanos y Cia.

Patent Advisor

Bogotá, Colombia

2001-2002

- Translate patents.
- Prepare submission to local patent office.
- Prepare replies to local patent office.

### Baker & Mackenzie

Patent Engineer

Bogotá, Colombia

2000

- Translate patents
- Prepare submission to local patent office.
- Prepare replies to local patent office.
- Hold phone conferences with patent clients, both companies and inventors.

## Education



### Rutgers, The State University of New Jersey

Ph. D.

N. B., New Jersey, U.S.A.

2010

- Explored the basic principles of RNA structure. We constructed and explored databases of RNA structures to find patterns unique to RNA in conformational space. We also connected our knowledge based databases to Flory-like polymer models, to estimate fundamental polymer properties such as persistence length. The goal was to understand the connection between such properties and RNA sequence, with the ultimate lofty aim of understanding RNA folding.



### Universidad Nacional de Colombia

Chemistry Bachelor in Science

Bogotá, Colombia

2000

- Final work focused on exploring the PES of two reactions occurring over naive interstellar ice analogs using traditional Hartree-Fock quantum chemistry calculations.

## Supervision and Teaching

### SUPERVISION

#### Laura Timonet, M.Sc. Student from Spain

Uppsala University, Uppsala, Sweden (2016)

Worked on setting up and creating homology models of a class C GPCR's dimer for the UMAMI receptor using our in-house *pymemdyn* recipe for Gromacs membrane embedding and equilibration.

## Prerana Pradhan, Bachelor's final project

*Rutgers, The State University of New Jersey, New Brunswick, New Jersey (2010)*

Directed her work on our project for automated recognition of GNRA motifs on RNA structures. Poster presented at the regional ACS meeting in Wilmington, Delaware.

## TEACHING

- Free Energy Perturbation Lab, Molecular and Statistical Mechanics Course 1mb412, Uppsala University, (Fall 2016, Fall 2017)
- Co-lecturer, Principles of Nucleic Acid Structure, Karolinska Institute Doctoral Course 2430 (Spring 2011, Spring 2012, Spring 2014)
- Teaching assistant for Principles of Quantitative Biology, Rutgers, The State University of New Jersey. (Fall 2009)
- Teaching assistant for Physical Chemistry of Biochemical Systems, Rutgers, The State University of New Jersey. (Spring 2009)
- Teaching assistant for General Chemistry at Rutgers, The State University of New Jersey. (Spring 2004, Spring 2005, Fall 2005)
- Teaching assistant for Introduction to Chemical Experimentation lab at Rutgers, The State University of New Jersey. (Fall 2003, Fall 2004, Fall 2006, Fall 2008)
- Course instructor for "Prelude to the Sciences", Physics module, Faculty of Sciences at Universidad de los Andes. (Summer 2002, Summer 2003)
- Course instructor for "Prelude to the Sciences", Physics module, Faculty of Sciences at Universidad de los Andes. (June 26 – July 19 2001)
- Guide elaboration for the course "Prelude to the Sciences", Physics module, prepared for the Faculty of Sciences at Universidad de los Andes. (June – July 2001)
- Lab. and recitation Teaching Assistant at Universidad de los Andes. (August 2000 – February 2001)

## Skills

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<b>Chemistry</b>	RNASeq, RDKit, Maestro, Gromacs, CHARMM, Q, Gaussian, GAMESS, Pymol, VMD, Knime
<b>Programming</b>	Python, Fortran, R, Bash, LaTeX
<b>SysAdmin</b>	Rocks, Docker, TravisCI, CentOS, Fedora, Debian, MacOS, Windows 10
<b>Web</b>	Flask, Django, HTML5, CSS3, HUGO, Jekyll, nginx, apache, gunicorn, postgresql, mysql
<b>Languages</b>	English, Swedish, Spanish

## Publications

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A complete list of publications can be found at ORCID online:

<https://orcid.org/0000-0002-1775-586X>