



Master's programme in Biomolecular Sciences - Systems Biology (MSc)

Do you want to contribute to our understanding of how systems function as a whole?

At the other end of the malnutrition scale, obesity is one of today's most blatantly visible - yet most neglected - public health problems. Paradoxically coexisting with undernutrition, an escalating global epidemic of overweight and obesity ('globesity') is taking hold in many parts of the world. If immediate action is not taken, millions will suffer from a range of serious health disorders. Obesity poses a major risk for serious diet-related non-communicable diseases, including diabetes mellitus, cardiovascular disease, hypertension and stroke, as well as certain forms of cancer. Obesity is a deficiency of a complete biological system; it is not clear why a surplus of nutrition would cause problems. No enzyme can be pointed at as being the source of malfunctioning of the system in total. Therefore, we need to understand the system as a total in quantitative way.

The added value of the Master's in Systems Biology

During the Master's programme in Biomolecular Sciences - Systems Biology, you receive training as a specialized researcher. Accordingly, in addition to receiving a thorough grounding in general cell biology, you will also be able to comprehend and explain the behaviour of systems. An additional advantage of this Master's variant is its international component, namely the research project in the second year. This is because Systems Biology is a new field that is primarily flourishing within international networks of researchers. As a graduate of this programme, you will be well prepared to undertake a PhD, either at home or abroad.

- This advanced Master's in Systems Biology belongs to a select group of internationally oriented Master's programmes, referred to within the Dutch system as 'Topmasters': the programme's classes are given by researchers with excellent international reputations.

- Systems Biology is a field of the greatest importance. The future direction of research in cell biology will involve combining the vast amounts of data generated (via genomics, proteomics and the like) with the appropriate use of quantitative models of cell function.

A detailed look at the Master's programme

The Master's programme in Systems Biology takes two years and consists of 120 credits. The programme is taught by means of formal lectures, research lectures, tutorials, demonstrations, laboratory visits, practicals and lab-based instruction, or using given computer applications. Master's students are expected to be highly motivated. They must also have an inquiring mind, and a critical and alert attitude.

The structure of the programme

The compulsory courses in Systems Biology are given in the first year (from September to the end of June). Most students start with this compulsory course. Students with shortcomings in their educational background can first bring their knowledge up to standard by attending specific Bachelor's courses. In this way, all students ultimately reach the same level. Following the compulsory courses, students start their research project. This research project, part of which is carried out at an institute abroad, is the main element of the second academic year. The Master's Coordinator can advise you on how to put together an individual study programme. Systems Biology is one of two Master's degrees in the field of Biomolecular Sciences, the other being Cell Biology.

The programme consists of:

- Portal course
- Central courses
 - Ab initio modelling of biological systems
 - Sequence analysis
 - Molecular cell physiology and function
 - System identification of dynamic systems
 - Biological fluorescence
 - Intracellular networks
 - Physics of biological systems
 - Philosophy of Systems Biology
 - Current topics in Systems Biology





- General courses
 - History of science / Ethics
 - Scientific writing in English
- Research project
 - Exploring options for future research project (including literature study)
 - An eight-month research project

Research project

A characteristic feature of the programme is the collaboration with renowned research institutes in other countries, involving seminars in the course 'Current topics in Systems Biology course', and research projects. The latter is partly carried out at an institute belonging to the BioCenter Amsterdam, and partly at a collaborating institute abroad and must contain both an experimental part and a modelling part. There are exchanges with universities in Berlin (Germany), Glasgow (Scotland), Kaunas (Lithuania), Moscow (Russia) and Barcelona (Spain).

The study programme is not limited to courses given in the Faculty of Earth and Life Sciences and the Faculty of Sciences at VU Amsterdam. Classes are also presented by lecturers from the Universiteit van Amsterdam, the National Research Institute for Mathematics and Computer Science in the Netherlands, and the FOM Institute for Atomic and Molecular Physics. With the approval of the examination board you can take subjects outside VU Amsterdam, inside or outside the university system, or abroad.

Once you have passed all the components of the Master's programme, you will be awarded the title of Master of Science. This is recognized internationally.

Career prospects

The majority of Systems Biology Master's students go on to take up research posts (usually leading to a PhD) at universities, scientific institutes, hospitals, or companies. There are some very promising job opportunities for systems biologists. Until recently, there were so few applicants for temporary positions that candidates had to be sought abroad.

"I opted for this particular Master's since I wanted my studies to have a clear direction, without automatically excluding interesting fields of research. At such an early stage in my career, it is a privilege to receive instruction in a field that will probably develop into one of the most important areas in biological research. Other researchers will just have to try and catch up, at a much later stage in their career. The best thing about this Master's is the exceptionally good coaching given by the lecturers, who are prepared to help with just about anything. This Master's offers many opportunities. You are free to choose the area of systems biology that you would like to explore further. The choice ranges from Microbiology to Oncology, or Neurobiology. In all of these areas you will be one step ahead of the rest."

Jaap van Doesburg, Master's student in Biomolecular Sciences - Systems Biology

Admission requirements

You qualify for direct admission to the Master's programme in Systems Biology with a Bachelor's degree in Biomedical Sciences or Biology from a university in the Netherlands. If you have a Bachelor's degree in another subject (e.g. Chemistry, Physics, qualification as a research technician), the examination board will assess your credentials and set additional requirements where appropriate. Please contact the Master's Coordinator for details.

Registration and enrolment

You can find out how to apply for the Master's programme in Biomolecular Sciences - Systems Biology in the general section of this brochure. For more information please visit www.falw.vu.nl/masters.

Would you like to know more?

For more information on the Master's programme, please visit:
www.english.vu.nl or www.falw.vu.nl/systemsbiology.

Or contact:

Dr K. Krab, Master's Coordinator
De Boelelaan 1085, room G 226f
1081 HV Amsterdam
The Netherlands
T +31 (0)20 5987168
E systems.biology@falw.vu.nl

Master's programme in Biomolecular Sciences - Systems Biology (MSc)

Faculty of Earth and Life Sciences

Duration: 2 years
Course type: full-time
Application deadline: Non-EU/EEA residents are well advised to apply before 1 March 2006, since the paperwork will take a considerable amount of time.
Language proficiency: TOEFL 550/213 or IELTS 6.5

Tuition fee: The fees for 2005/2006 were € 1,496 for students from EU/EEA countries and non-EU/EEA countries. See p. 61 for more information.