



MSc in Computational Genomics

The genomics sciences have revolutionised our ability to explore at the molecular level every living organism on the planet. Using innovative and powerful algorithms, genomics scientists continue to identify and analyse the signals encoded in DNA sequences in areas as diverse as agriscience, evolutionary biology and precision medicine.

This programme is specifically designed to train the next generation of quantitative scientists and engineers to work in this exciting new field. With backgrounds ranging from mathematics, statistics, physics, computer science and engineering, graduates of this programme will learn advanced analytical techniques and gain practical experience in applying these techniques to genomics data.

Contact information / Enquiries to:

Dr. Pilib Ó Broin
School of Mathematics, Statistics and
Applied Mathematics
T +353 91 492337
E pilib.obroin@nuigalway.ie

Computational Genomics (MSc)

Course level: Level 9

Duration: 1 year

Entry Requirements:

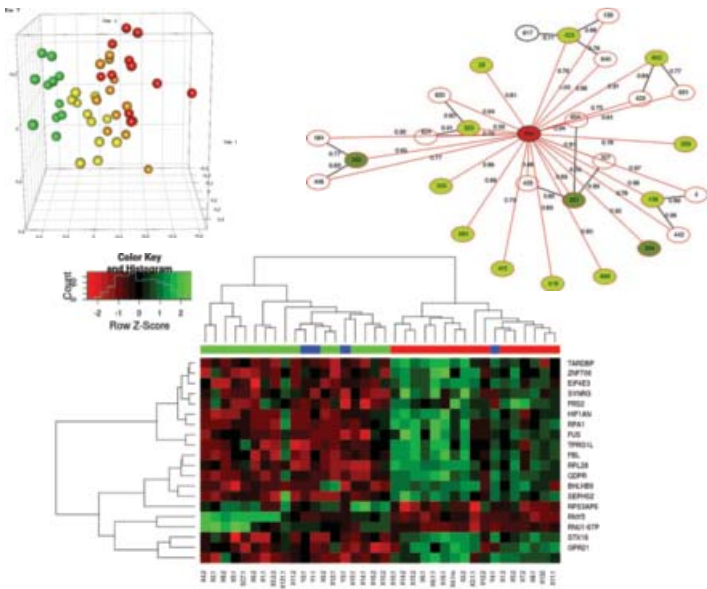
Applicants must have achieved a second class honours degree or better in a discipline relevant to the MSc programme. Qualifying degrees include, mathematics, theoretical physics, physics, statistics, computer science and engineering (biomedical or electronic/electrical/computer engineering).

Fees: €6,815 (EU) €13,750 (non-EU)

Applying: www.pac.ie/nuigalway

PAC code: GYS32

Closing date: Places will be allocated on a rolling basis and candidates are advised to apply as early as possible.



Why study this programme?

This course will provide postgraduate training with a specific emphasis on the use and development of algorithms and computational techniques to analyze and understand genomic data. Rapid advances in the technologies used to sequence DNA and RNA have led to an increase in the breadth of application of these sequencing-based genomics technologies, from fundamental scientific discovery in the life sciences to clinical applications in precision medicine. This requires a new generation of highly trained scientists who possess not only an understanding of the underlying biological principles and scientific technologies, but also the quantitative and computational skills necessary to analyze the large data sets generated using these cutting-edge genomics techniques.

Employment & Career opportunities

This is an exciting new programme that will provide graduates with a highly marketable and transferable combination of computational and analytical skills as well as specialist knowledge of the application of these skills in the analysis of genomics data. Graduates will be well placed to seek employment in the application of genomics technologies to a wide range of industries, including biotechnological and pharmaceutical research and development, as well as in healthcare.

Programme Outline

The course comprises 90 credits; 60 credits will be obtained from taught modules and 30 from an individual research project. Students will undertake training in a bespoke molecular biology programme that reflects their prior studies in the quantitative or computational sciences. Students will also take a set of specialist modules including advanced techniques for genomics data analysis as well as modules on machine learning, data analytics and scientific visualization.

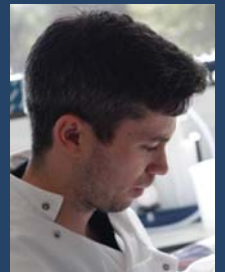
Core modules

- Programming for biology
- Overview of molecular biology/genetics concepts
- Statistical computing in R
- Algorithms for molecular biology
- Medical genomics I: genomics of rare and common diseases
- Medical genomics II: the cancer genome
- Genomics techniques I: sequencing library preparation
- Genomics techniques II: genomics data analysis

Optional modules include

- Scientific visualization
- Probabilistic models for molecular biology
- Molecular and cell biology of cancer
- Advanced and applied immunology
- Stochastic processes
- Machine learning
- Applied statistics
- Advanced probability with applications
- Linear modeling
- Bayesian Modeling

Alan Barnicle, NUI Galway graduate and R&D Scientist at Cambridge Epigenetix, Cambridge, U.K.



“I was recruited by Cambridge Epigenetix in the U.K., a start-up genomics company backed by Google Ventures, just after completing my Ph.D. in Bioinformatics at NUI Galway. It's an exciting place to be as we are working at the frontier of technology development. My job as an R&D scientist covers a whole range of activities, from working on innovative genomics techniques used to study individual samples, to the development of new bioinformatics tools necessary to interpret the resulting data. The new Masters programme in Computational Genomics at NUI Galway provides exactly the sort of skillset that genomics scientists need in this highly dynamic and hugely rewarding career - particularly for those graduates who may have no formal prior experience of molecular biology, but whose computational/mathematical skills will see them in high demand.”

bioinf.nuigalway.ie

Contact information/Enquiries to:

Dr. Pilib Ó Broin, School of Mathematics, Statistics and Applied Mathematics

T +353 91 492337 | E pilib.obroin@nuigalway.ie | W <http://www.maths.nuigalway.ie/bioclust/researchers/pilib>