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Computational biology masters

Computational biology involves the application of computers and computer science to the understanding and modelling of biological structures and processes. Computational biology entails the use of computational methods (e.g., algorithms) for the representation and simulation of biological systems, as well as for the interpretation of experimental data, often on a very large scale. This stream also focuseson modelling biological processes using a mixture of mathematical and computer models. UCL is an international leader in computational biology research and has many collaborations between the biological sciences, and mathematics, statistics and computer science. Students coming to UCL will have access to the expertise found within the UCL Centre for Computational Biology. ALL areas of the biosciences are seeking early career scientists with strong quantitative (computing, mathematical, statistical) skills. Students graduating through the Computational Biology stream will be very competitive for PhD places as well as careers in the private sector computing and bioinformatic areas. Research covers a wide range of biological problems including theoretical and statistical ecology (e.g. Richard Pearson; David Murrell; Wenying Shou), computational and statistical genetics (e.g. Richard Mott; Garrett Hellenthal); computational genomics (Maria Secrier; Aida Andrés); evolutionary genetics (Andrew Pomiankowski; Max Reuter; Ziheng Yang); systems biology (Francois Balloux; Chris Barnes; Wenying Shou); and quantitative biology (Wenying Shou).High dimensional predictive modeling of acute cognitive dysfunction The evolution of niche with and without mutualism Analysing mitochondrial segregation in fission yeast Artificial selection of whole microbial communitiesStatistical causal inference from observational time series dataThe programme is seeking applications from students who are keen to further their skills in computational biology across any of the topics covered above. Applicants should be able to demonstrate strong skills in mathematics, statistics and/or computer programming and as well as a strong desire to apply them to key questions in biology. Interested students can contact the stream tutor Ziheng Hang by emailing z.yang@ucl.ac.uk or the overall programme lead David Murrell d.murrell@ucl.ac.uk The student will choose a taught module after discussion with the project supervisor, as the taught module may be related to the research project. Possible options include the following: Please Note: There may be access to modules other than those provided in the following lists. However, all optional modules must have the approval of the subject stream tutor. Some modules may be appropriate for more than one subject stream. You can view further information about the modules in the Module Catalogue. Computational biology involves the application of computers and computer science to the understanding and modelling of biological structures and processes. 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Professor of Experimental Neuropathology Professor of Translational Neuroscience Professor of Neurology and Neurobiology Professor of Biochemistry Principal Investigator and Wellcome Trust Career Development Fellow Group Leader (Innovation Investigator track) in A-TAP Data Science Professor of Computational Biochemistry Professor of Computational Neuroscience Professor of Biochemistry and Wellcome Principle Research Fellow Professor of Developmental Haematopoiesis Professor of Neuroscience Director of the Oxford Headache Centre and Director of StemBANCC Posttranscriptional networks in infection Professor of Medical Statistics and Director of CSM Associate Professor, Director of Taught Programmes Professor of Medical Statistics Professor of Molecular Immunology Lead Health Data Scientist Professor of Biomedical Informatics Associate Professor of Neuroscience Senior Research Associate Professor of Molecular Immunology, Wellcome Trust Senior Research Fellow Emeritus Professor of Epidemiology, Nuffield Department of Women’s & ... MRC Career Development Fellow Principal Beamline Scientist Professor of Infectious Diseases Consultant in Medical Oncology Professor of Biophysical Immunology (Innovation Investigator Track) Professor of Plastic and Reconstructive Surgery CRUK Career Development Fellow Professor of Neurogenetics Professor of Trials and Epidemiology of Kidney Disease, Renal Studies Group Professor of Molecular Parisitology Lakshmi Mittal and Family Professorship of Vaccinology Hoffmann and Action Medical Research Professor of Developmental Medicine Principal Investigator, Wellcome Trust Clinical Career Development Fellow Professor of Gene Regulation Professor of Virology and Immunology Professor of Biomedical Engineering Professor of Metabolic Medicine BRC Consultant in Paediatrics and Vaccinology. Iveagh Professor of Microbial Biochemistry Associate Professor of Molecular & Cellular Biochemistry Professor of Molecular Cell Biology Wellcome CDA Research Fellow Head of Project Information Science KTRR Senior Research Fellow in Data Science Associate Professor in Molecular & Cellular Biochemistry Kennedy Director of Graduate Studies Director of the Oxford Centre for Integrative Neuroimaging (OxCIN) Professor of Experimental Psychology Senior Research Fellow in Cardiovascular and Genetic Epidemiology Professor of Neuroimaging Statistics, Nuffield Department of Population Health Professor of Molecular Biology Principal Beamline Scientist Associate Professor, Medical Image Analysis and Machine Learning Professor of Circadian Neuroscience Ashall Professor of Infection & Immunity Professor of Pharmaco- and Device Epidemiology Professor of Evolution & Infectious Disease Professor of Cardiovascular Medicine and Population Health Group Leader, Soft Condensed Matter Village Senior Research Scientist in Artificial Intelligence (AI) for Epidemiology Professor of Molecular Biophysics Emeritus Professor of Paediatric Haematology Professor of Paediatric Haematology Associate Professor & Wellcome Trust Senior Research Fellow Associate Professor of Computational Genomics Professor of Biomedical Engineering Professor of Developmental Biology Professor of Cognitive Neuroscience Associate Professor of Developmental Biology Professor of Molecular Immunology Professor of Paediatric Gastroenterology, Group Head / PI and Hon Consultant ... Sir Henry Dale Research Fellow Associate professor, group leader Deputy Director of Life Sciences Associate Professor; Tutor and Fellow in Biochemistry at Trinity College Professor of Modelling and Epidemiology Associate Professor & Senior Research Fellow Associate Professor & Senior Research Fellow Professor of Cell and Developmental Genetics Professor of Neuroscience Associate Professor of Translational Data Science Wellcome Trust Career Development Fellow Wellcome Trust Clinical Research Career Development Fellow Professor of Artificial Intelligence Professor of Cognitive Neuroscience Professor of Virology & Director of Glycobiology Inst Head of Department, Professor of Reproductive & Genomic Epidemiology, ... Computational biology involves the application of computers and computer science to the understanding and modelling of biological structures and processes. 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The key deadlines are: November 15th: For international and early domestic applicants (decision in December). January 15th: For all applicants (decision in March). April 9th: For domestic applicants only (decision in June). (Date updated) Supporting documents must be submitted by the selected deadline. Applicants must have: A four-year BSc degree or nearing completion. A B+ average or higher for MSc admission. An A- average or higher for PhD (Direct Entry). Applications are reviewed holistically, considering transcripts, research experience, references, and the personal statement. Transcript Requirements: MSc: Minimum cumulative B+ GPA. PhD: Minimum cumulative A- GPA. Consideration is given to academic trajectory and scientific course performance. Competitive Applicants: Non-classroom experience in laboratory work (wet or dry). Strong backgrounds in relevant fields such as genetics, molecular biology, or quantitative sciences with an interest in biology. International Applicants: Degree equivalencies are evaluated upon application submission. English language proficiency is required if prior education was not in English. Minimum scores for English tests: TOEFL IBT: 93 (Writing/Speaking 22) IELTS: 7.0 (minimum 6.5 in each component) Meeting minimum standards does not guarantee admission. Starting September 2024, PhD students are guaranteed five years of funding with two automatic one-year extensions, while MSc students receive three years of funding with a one-year extension. Those starting before September 2024 receive full program duration funding. Funding sources include scholarships, fellowships, and supervisor grants. Stipends follow the Harmonized Base Funding Agreement, with tuition reductions for extended PhD students. Top-ups of $2,000–$4,000 apply to external awards, but exclude certain UofT Fellowships. Access our application procedures The Medical Genomics Program offers two rounds of admissions for a September start. The key deadlines are: January 15th: For all applicants (decision in March). May 1st Applicants entering the program in either stream who have NOT completed an advanced (graduate level) degree will have obtained a minimum undergraduate B+ grade average. Applicants entering the program following the completion of an advanced degree will have received a minimum undergraduate B grade average. Applicants will complete an application package including: All previous university transcripts Curriculum vitae (CV) Letter of intent (1 to 2 pages maximum), including how this program will have an impact on their future career path Three reference reports from professional, academic, or other qualified referees Preferred applicants will have relevant research and/or clinical experience and demonstrate an immediate and substantive use of this degree in professional practice. We will invite them for a 30-minute interview to confirm student excellence. Twenty students will be accepted per year. Visit Medical Genomics Applications Procedures Applications open on September 12, 2025 Required Prerequisites All Applicants must register with the National Matching System (NMS). The Application Procedures page provides instructions. Four-year bachelor's degree preferably in the biological sciences, including the prerequisite courses listed below in bold from a recognized university. Please note the following prerequisite courses must entirely pertain to the specified subject matter (i.e. a segment within another course will not qualify). Please also note that the application form will require you to list the course code, title and URL link to the syllabus of courses you have taken that meet the prerequisite requirements. We have indicated comparable courses at the University of Toronto (where indicated). We will not review applications that do not satisfy the prerequisite requirements. If you did not yet complete prerequisites at the time of application, you must provide proof of enrollment. Biology Molecular Biology/Genetics Biochemistry – comparable course at the University of Toronto BCH210H1: Biochemistry 1: Proteins, Lipids and Metabolism Embryology – comparable course at the University of Toronto: ANA301H1: Human Embryology. If a comparable course is not offered at your institution, a comparable online course from a recognized post-secondary institution (e.g. University of Cincinnati, Clinical Embryology) that provides a grade is acceptable. We will accept Developmental Biology in lieu of the Embryology pre-requisite requirement if it focuses heavily on development. Statistics (an introductory course is acceptable) Psychology (an introductory course is acceptable) ***We do not accept Advanced Placement (AP) courses*** **Please note that the Molecular Biology/Genetics prerequisite must be completed in the last 5 years or less.** **All prerequisites must be completed by April 30.** **Please consider applying for the next academic year cycle if you have two or more outstanding requirements.** Academic Standing Cumulative GPA of 3.3 (77%-79%) out of a possible 4.0 Academic standing of a minimum of B+ in the above required pre-requisite courses. Experience In Counselling Setting This experience can be paid or volunteer and can include a family planning centre, a crisis intervention centre or a textline/hotline. This experience should promote the development of communication and interpersonal skills. Therefore, a component of training supervision would be beneficial. This must be 1-1 counselling experience Language Requirements If your primary language is not English and you graduated from a non-Canadian university where the language of instruction and examination was not English, you must complete an English facility exam. You must meet this requirement at the time you submit your application. You may complete any of the following tests: TOEFL (U of T Institutional code: 0982-00) Paper-Based Test & TWE: Overall Score 580, TWE 5 Internet-Based Test IBT: Overall Score 93, Writing/Speaking 22 IELTS: (Academic) 7.0, with at least 6.5 in each component MELAB: 85 COPE: 76 (with at least 22 in each component and 32 in the writing component) Academic Preparation Course: Final grade of B in Level 60 Access Application Procedures Faculty and students from the Department of Molecular Genetics discuss how our graduate programs drive discovery and innovation. Skip to main content Data and technology increasingly drive molecular genetics, and computational biology plays a critical role in these advances. Computational biologists use physics, math, or computer science methods to model biological processes or analyze genomic data, for example. The availability and continuing generation of large-scale datasets and data analysis have created a high demand for researchers with advanced computational skills and a strong grasp of molecular biology. The CBMG track aims to provide students with an immersive computational biology education. Students are admitted to the Molecular Genetics PhD program and are provided opportunities and courses specific to their discipline to maximize their training potential. CBMG Co-ordinators: Director: Dr. Gary Bader, Rm 602, Donnelly Centre Associate Director: Dr. Hannes Röst, Rm 604, Donnelly Centre CBMG Curriculum Guided reading: During the summer before the official start of graduate studies, we may provide you with essential reading and study material to complement your undergraduate education as needed. When possible, summer placement will facilitate obtaining a paid internship to enable you to obtain hands-on computational or wet-lab experience in Molecular Genetics. Rotations: In the fall of the 1st year, you'll take three five-week rotations before joining your thesis lab. Genetics, Genomics, and Proteomics: In the fall of the 1st year, we will teach you about diverse current research topics relevant to computational biology (Professors Howard Lipshitz, Tim Hughes, and Anne-Claude Gingras) as part of our PhD Core Curriculum. Graduate Computational Biology: In the winter of the 1st year, you will take intensive hands-on courses in computational biology, Foundational Computational Biology I and II (Professors Fritz Roth and Kieran Campbell) (Foundational Computational Biology I is a part of MMG1344H and Foundational Computational Biology II is a part of MMG1345H under Topic Courses). Thesis topic: You may choose any topic within the many fields of study represented in the department. Most labs rely on genomic and computational technologies in some way, and for many, it is their primary focus. Socializing: Annual retreats and other social & scientific events to help you meet other Molecular Genetics students at all stages of their PhDs. Given the more specific curriculum, CBMG students may only join the Molecular Genetics program for September entry (not January). All successful CBMG applicants will be admitted directly into the PhD Program. Admissions require: A Bachelor’s degree in life sciences or quantitative disciplines (physics, math/stats, computer science, chemistry or engineering). An undergraduate average of A- or higher (or equivalent). Evidence of comfort and ease with computer programming, e.g. academic excellence in multiple computer courses, computational research, programming through employment or extracurricular activities. Academic excellence in two or more quantitative subjects: calculus, linear algebra, probability/statistics or other math or quantitative courses. Research experience outside the classroom — wet or dry, biological or non-biological.This includes summer studentships, a lab job that involves working on scientific problems and most fourth-year honours projects. At least two letters of reference. A letter of intent - be sure to explain your interest in the CBMG PhD track. A successful interview. * Please note CBMG requirements are in addition to, and not in place of the standard Molecular Genetics Graduate Academic Requirements. See the Graduate Admissions for full details on deadlines and admission procedures. *International applicants may need to submit additional materials in their application package. See International Students for details. We provide a welcoming environment for students and support them with the tools and mentorship needed to succeed in fast-paced, cutting-edge interdisciplinary fields.