**DEPARTMENT OF CHEMISTRY**

UNIVERSITY COLLEGE LONDON

**Job Description**

**Job Title:**  Research Associate in Cerebral Blood Flow Modelling at Extreme Scales

# Department: Chemistry

**Location:** UCLBloomsbury Campus

**Reports to** *Professor Peter Coveney*

**Grade:** 7

**The Project**

The successful candidate will join a very active inter-disciplinary group in the Centre for Computational Science, and will work on the development and deployment of medical and clinical applications of the lattice-Boltzmann method for blood flow using the HemeLB software environment. This post is funded by the European Commission as part of the ComPat project in the Future Emerging Technologies for High Performance Computing initiative. HemeLB is designed to support clinical decision support in the treatment of patients suffering from aneurysms and other neurosvascular malformations. A Ph.D. degree—involving a substantial high performance computing component—in physics, computer science, computer engineering or applied mathematics, with experience preferably in the lattice-Boltzmann method or other computational fluid dynamics techniques, is essential requirement. Experience of developing simulation codes for parallel computing hardware is essential, alongside a proven ability to programme quickly and effectively in state of the art high performance computing environments. Proficiency in C++ and at least one other language (e.g. Python) is required. Additional experience in developing and exploiting state of the art medical imaging, visualisation and steering methods, as well as multiscale modelling, would be advantageous.

**Main Purpose**

The post-holder will work primarily on scientific applications of HemeLB, a flexible lattice-Boltzmann code for the simulation of blood flow in support of medical and clinical decision making, and for physiological research. The post-holder will be expected to engage closely in the development of software within the project, and with the verification and validation of the methods being deployed, in order to facilitate uptake of HemeLB within the context of the CER2EBRAL project. In particular, he/she will incorporate models of flow-diverting stents and validate these in both *in vitro* models and *in vivo* trials.

**Duties and Responsibilities**

To carry out research under the supervision of the Director of the Centre for Computational Science (Professor P V Coveney), as follows:

* Development of the existing HemeLB lattice-Boltzmann algorithms and codes for optimised performance on multi-exascale testbeds, including coupling to other codes. Primary applications are in physiology, together with basic and clinical medicine. Inter alia, the postholder will work to develop and support computational models of flow-diverting stents obtained from manufacturers, and will validate these models in in vitro aneurysm models and in preliminary in vivo trials.
* Running of HemeLB on workstations, clusters, supercomputers and combinations of these; and emerging architectures on the path to the exascale.
* Integration of patient specific brain medical imaging data from various modalities. Development and extension of analysis and visualisation methods for the interpretation of numerical simulation data, including computational steering tools and approaches.
* Preparation of research papers for publication in the scientific literature; and of fully documented manuals describing the content of the codes used and developed during the course of the appointment.
* Participation in regular meetings with colleagues at UCL, and with colleagues in projects in which CCS is participating including the reporting and assistance in the reporting of results from the work being performed at UCL within these projects. This will entail some level of foreign travel, particularly within Europe for purposes of collaboration within the ComPat project. Participation in preparation and submission of future grant applications.
* Assistance in the supervision of post-graduate and undergraduate students working on related computational projects within the CCS and more widely.
* The postholder is required to undertake a limited amount of teaching in relation to the subject area.
* The postholder will carry out any other duties as are within the scope, spirit and purpose of the job as requested by Peter Coveney or the Head of Department.
* To undertake a limited amount of teaching in relation to subject area.
* The job description reflects the present requirements of the post, and as duties and responsibilities change/develop, the job description will be reviewed and be subject to amendment in consultation with the post-holder.
* The postholder will carry out any other duties as are within the scope, spirit and purpose of the job as requested by the line manager.
* The postholder will actively follow UCL policies including Equal Opportunities and be expected to give consideration within their role as to how they can actively advance equality of opportunity and good relations between people who share a relevant protected characteristic and people who do not share it.
* The postholder will maintain an awareness and observation of Fire and Health & Safety Regulations.
* To be aware of and act upon:
  + - Disciplinary procedure and Disciplinary rules
    - Grievance procedure
    - Section 7 and 8 of the Health and Safety at Work Act

**UNIVERSITY COLLEGE LONDON**

**Department of Chemistry**

**Person Specification for the Post of Research Associate**

**Knowledge – including Qualifications**

PhD degree in an area of the mathematical, physical, engineering and computer sciences or related areas. (Essential)

At least two high quality scientific publications (or “in press”) (Essential)

GCSE English Grade C or above (or equivalent, e.g. IELTS >= 6.5) (Essential)

**Experience**

Extensive experience of modelling and simulation, particularly involving high performance computing, preferably with the lattice-Boltzmann method, or other computational fluid dynamics methods. (Essential)

Proven parallel programming ability in C++ and familiarity with one other programming language (e.g. Python). (Essential)

Able to demonstrate significant experience in the use of high performance visualization. (Desirable)

Excellent IT skills as required for performing post, including good knowledge of software and hardware tools used in HPC environments, at the petascale. (Essential)

Experience with multiscale modelling. (Desirable)

Ability to develop and give advice on strategic decisions within the domains of high performance computing and computational fluid dynamics in the context of biomedicine. (Desirable)

**Skills & Abiliites**

Good presentational skills. (Desirable)

Excellent interpersonal relations with junior and senior staff, and excellent networking skills. (Essential)

An ability to work alone as well as within a group. (Essential)

Self-motivated and able to use his/her initiative. (Desirable)

Willingness to travel for European and other international meetings. (Essential)

Excellent organisational skills. (Essential)

Practical problem solving under time constraints and the ability to work to deadlines. (Desirable)

Clear, comprehensive and technically correct communication (English - written and oral), as the post holder will be required to write reports, papers, presentations and documentation. (Essential)

The ability to learn quickly and assimilate large amounts of information, and present this confidently in meetings. (Desirable)

**General Information**

**Terms & Conditions of Employment**

The post is a UCL grade 7 post, the salary for which ranges from £30,434 to £37,394 per annum (excluding London Allowance of £2,919 p.a.). Starting salary is usually £30,434. Progression through the salary scale is incremental. Please note, appointment at Grade 7 is dependent upon having been awarded a PhD; if this is not the case, initial appointment will be at Research Assistant Grade 6 (salary £26,976 - £31,614 p.a. inclusive of London Allowance) with payment at Grade 7 being backdated to the date of final submission (including corrections) of the PhD thesis. Cost of living pay awards are negotiated nationally and are normally effective from 1st August each year. UCL’s non-clinical pay and grading structure is at <http://www.ucl.ac.uk/hr/salary_scales/final_grades.php>.

UCL’s terms & conditions for research staff are at <http://www.ucl.ac.uk/hr/salary_scales/Support_Research_tcs.php>

The full range of benefits is at <http://www.ucl.ac.uk/hr/benefits/employee_benefits.php>

**Equal Opportunities**

UCL recognises that in our society, individuals and groups are discriminated against both directly and indirectly on the grounds of: age, colour, disability, ethnic origin, gender, HIV status, marital, social or economic status, nationality, race, religious beliefs, responsibility for dependants, sexual orientation, trades union membership or unrelated criminal convictions.

To counteract discrimination, UCL is committed to actively opposing all forms of discrimination, raising awareness and tackling the causes and consequences. It is committed to providing a learning and working environment in which the rights and dignity of all its members are respected and which is free from discrimination, prejudice, intimidation and all forms of harassment including bullying; to making staff and students feel valued, motivated and enabled to do their best work and to creating a safe, welcoming working environment accessible to all.

The Department has been awarded a Bronze Athena Swan Award and we support the Athena beliefs that:

* The advancement of science, engineering and technology (SET) is fundamental to quality of life across the globe.
* It is vitally important that women are adequately represented in what has traditionally been, and is still, a male-dominated area.
* Science cannot reach its full potential unless it can benefit from the talents of the whole population, and until women and men can benefit equally from the opportunities it affords.

Further information on Athena Swan is at <http://www.athenaswan.org.uk/>

**TO APPLY**

**Apply online at:** [**http://www.ucl.ac.uk/hr/jobs/**](http://www.ucl.ac.uk/hr/jobs/)under **Ref no: 1472241**

**You will need to register to use the system if you have not used it before and are able to do this after you have clicked on the 'Apply now' button at the bottom of the page.**

Thank you for your interest in this post and the Department of Chemistry at UCL