**Title:** Aerosol Deposition in the Sinunasal Airways – from infant to adult

**Type of award**  
PhD Research Studentship

**Department**  
Mechanical Engineering, Fluids and Aerodynamics Research Group

**Scholarship**  
Minimum £17,668 p.a. subject to confirmation of eligibility and award

**Duration**  
3.5 years

**Eligibility**  
Home/EU/Overseas

**Start Date**  
September 2023

**PhD Topic Background/Description**

The deposition and uptake of nanoparticles in the sinunasal airways (olfactory cleft and sinuses) is of growing concern. Whereas the deposition fraction may be low, these sites provide a more direct route to the brain with adverse consequences that may be disproportionate to the perceived dose. In this project, the student will study experimentally and computationally how variations of airway morphology and the breathing profile affect the transport of inhaled nanoparticles.

The starting point for both experimental and computational studies will be realistic airway geometries derived from pre-existing CT/MRI scan data of the nasal airways. Morphological characterisation focuses on the sinunasal airway, its development from the infant to the adult, with the aim of understanding how the highly optimised biological design functions.

Computational flow modelling will then be applied to relate geometry and flow patterns in realistic airways at different ages. This paves the way for intense data analysis, leading to the design of simplified geometries that provide appropriate experimental test platforms which preserve the essential flow characteristics. The final stage of the project will then quantify how the particular geometry of the sinunasal airways affects deposition rate and the consequent deposition burden of potentially toxic inhalants.

The student will join multidisciplinary teams comprising in computational and experimental fluid mechanics and airway surgery. They will benefit from close interaction between the different engineering specialities and experts in toxicology and medicine. Prospective candidates should have a maths/engineering background or be a numerate biological scientist with a keen interest in mathematical modelling of biological processes. The supervisory team includes academics and clinicians, across University of Bristol, Imperial College London, NHS trusts, UKHSA.
**Candidate Requirements**

Applicants must hold/achieve a minimum of a master’s degree (or international equivalent) in a science, mathematics or engineering discipline. Applicants without a master’s qualification may be considered on an exceptional basis, provided they hold a first-class undergraduate degree. Please note, acceptance will also depend on evidence of readiness to pursue a research degree.

If English is not your first language, you need to meet this profile level:

**Profile E**

Further information about [English language requirements and profile levels](#).

**Basic skills and knowledge required:**

**Essential:**
High calibre in applied mathematics and programming skills

**Desirable:**
Knowledge in fluid dynamics and bioengineering. Experience with developing scientific computing software.

**Scholarship Details**

Funding is subject to award of either DTP or UoB Postgraduate Research Scholarship, further information on Postgraduate Research Scholarships can be found at [http://www.bristol.ac.uk/engineering/postgraduate/funding/pgr-scholarships/](http://www.bristol.ac.uk/engineering/postgraduate/funding/pgr-scholarships/)

Minimum tax-free stipend at the current UKRI rate is £17,668 for 2022/23. For eligibility and residence requirements please check the [UKRI UK Research and Innovation](#) website.

**Informal enquiries**

Please email Dr Alberto Gambaruto (alberto.gambaruto@bristol.ac.uk)

For general enquiries, please email came-pgr-admissions@bristol.ac.uk

**Application Details**

To apply for this studentship, submit a PhD application using our [online application system](#) [www.bristol.ac.uk/pg-howtoapply]

Please ensure that in the Funding section you tick “I would like to be considered for a funding award from the Mechanical Engineering Department” and specify the title of the scholarship in the “other” box below with the name of the supervisor.

Closing date for applications: **31 January 2023**