A day in the life of a research associate in bioinformatics

Dr Krutik Patel has recently completed his PhD in bioinformatics at Newcastle University and has since been employed as a research associate. His interests are in applying data science techniques applying data science techniques to answer interesting questions in biology and developing software for researchers. He started his undergraduate training in genetics at the University of Manchester and also completed his MSci project there.

Tell us how you got into science, and into bioinformatics particularly?

I have always been interested in biology, and what really motivated me to continue in research is the inherent complexities of cellular signalling pathways. It amazes me that the systems and structures found in cells within our bodies are more complex than any machines or buildings humans have ever created. I see bioinformatics (the use of computational/data science techniques to better understand biological questions) as a means to investigate large quantities of biological data in a meaningful way. Hence, my project goals include software development, building machine learning models and applying novel data science techniques on to biological data.

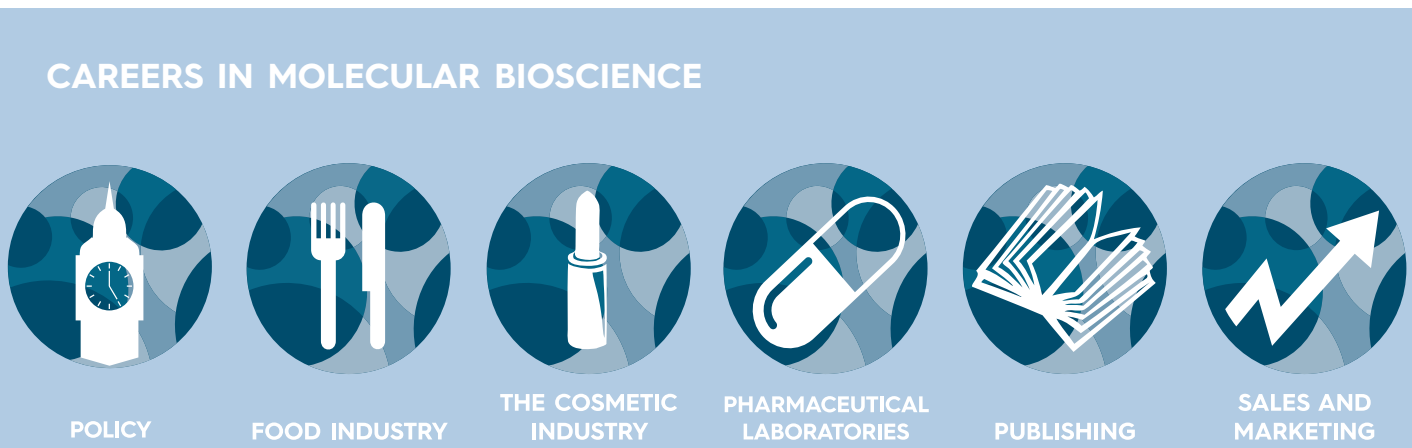
After my undergraduate training, I undertook an MSci with a bioinformatics team at the University of Manchester. Here, I learnt the basics of coding and bioinformatics. Did I publish any work from my Master's? No, but I learnt a lot about programming and how to deal with biological data in a logical way. If you are interested in data science and biology, I do think interdisciplinary courses such as these can help to get your foot in the door. After my MSci training, I began a PhD at Newcastle University, and I demonstrated that I was a good doctoral candidate as I had experience in programming and an interest in biological questions – these two traits can be very helpful for those wishing to apply for post-graduate training in bioinformatics.

Describe a typical day.

I typically work 9–5 in an office environment. Most tasks involve programming, utilizing high-performance clusters, building and maintaining bioinformatic pipelines, attending meetings and reading and writing academic papers. I also teach on seminars for undergraduate students. As a research associate, I have added responsibilities to help group leaders, post-graduate students and collaborators with tasks which revolve around bioinformatics.

What is the greatest challenge you have experienced?

During my PhD, I developed my own bioinformatic software to analyse multi-omic and time series datasets. This



was quite an undertaking, as it was very much a solo venture and none of my colleagues had experience in this. It took over 2 years of trial and error, but I managed to produce a novel tool for the biological research community. The tool was named *TimiRGeN* (Time incorporated miR-mRNA Generation of Networks) (Bioconductor - TimiRGeN), and led to an academic publication and also gave me a chance to attend several international conferences to present the work. The tool itself filled an analytical 'gap in the market' and has been downloaded hundreds of times. Overall, this project was extremely challenging for me, but the hard work and determination paid off.

What is your advice for someone who would like to get into bioinformatics?

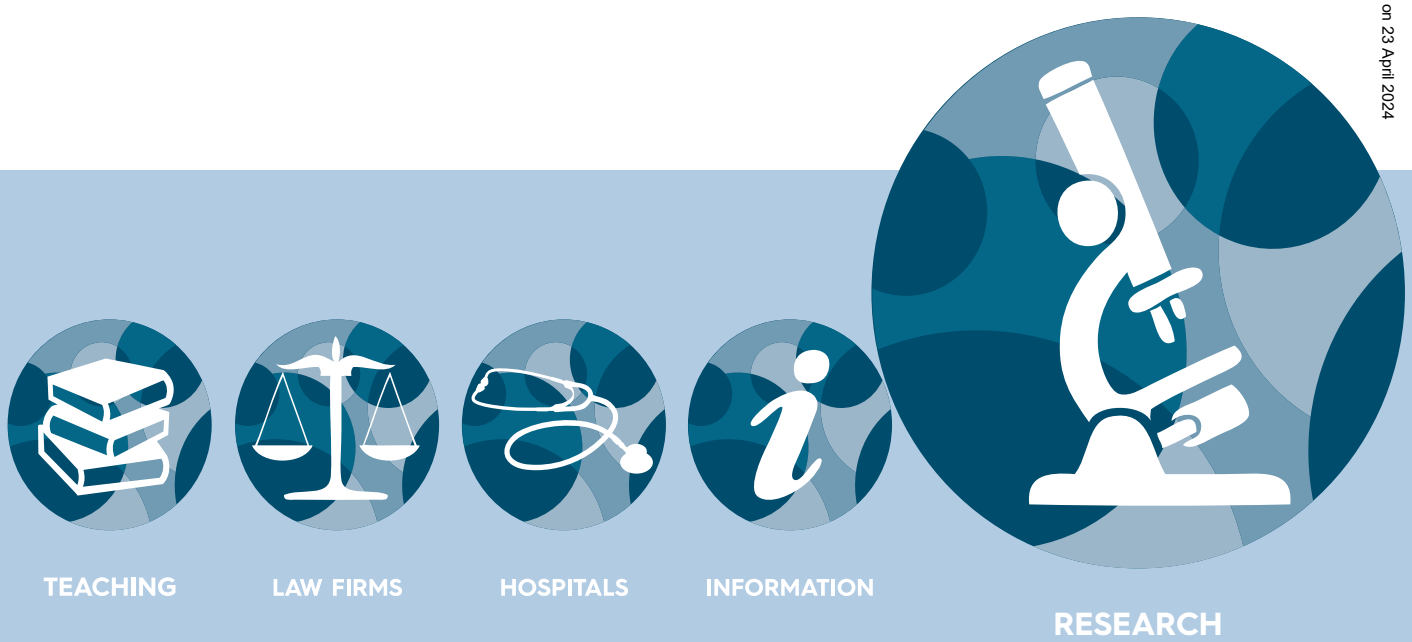
Learning to code in popular languages would be a big plus for those wishing to become a bioinformatician. I use a combination of *R*, *Python* and *bash*. I would highly recommend either *R* or *Python* to begin with, and there are many resources that can be used to aid learning. Courses are a great way to begin, such as those promoted by datacamp or the Biochemical Society. However, by far the best method is to get stuck in and learn by doing. I would suggest creating a small project which consists of uncomplicated tasks, e.g., creating graphs, manipulating data or applying functions and try them out in *R*, *Python* or any other language you are interested in learning. A great resource for free downloadable and interesting datasets can be found on kaggle. If you get stuck, do look online as most coding-related questions have probably been asked and are probably on a forum on the web, e.g., stackoverflow, R-bloggers or PythonGuides.

What do people not realize about your job?

You do not need to be amazing at maths and IT early on to go into bioinformatics. Seeing how maths and IT could be applied to biological questions altered my perspective on the subjects which I was less interested in during my school years. Neither maths nor IT was my strong suit. In my GSCEs, I received Bs in both and did not continue studying either for A-levels. However, during my Master's and PhD, I gained a greater appreciation for the application of these subjects which did not previously excite me. By reading algorithm papers, learning about machine learning theory, studying about hardware and software development, I could see how increasing my knowledge on maths and IT can address biological problems. Overall, keeping an open mind has greatly aided me as having inter-disciplinary skills is very valuable in research and in career growth.

Tell us why going into bioinformatics is a good career move?

Though I am a bit biased, I really do think bioinformatics is a good career choice. The main advantage is that programming can be applied in almost all industries, and across all fields of research within the biosciences. Programming and applying logical thinking to big data projects are great transferable skills. So, whether you are considering staying in academia or wish to find a data scientist role, work in banking or for the Office of National Statistics, it is certainly worth getting a few skills in this important and developing area. ■



Job profile

Research associates/post-doctoral researchers work in research teams and can range from junior to very senior roles. They are often tasked with working closely with group leaders on several projects. As a bioinformatician, I process, analyse, deliver and provide expert knowledge on the data being produced in our team. The outcome of such work will be academic publications, novel tools developed for researchers and overall greater knowledge about biological problems, solved through data science techniques.

Qualifications and key skills

A PhD in a bioinformatics, programming (*R*, *Python*, bash), publication record, knowledge of machine learning and appreciation of how challenging biological data can be.

Responsibilities

Autonomous work is required for research associates. Especially as one with specialist skills. I am required to discuss good data science strategies with the data being produced by colleagues. I'm also responsible for a bioinformatic pipeline maintenance.

Salary and career development

Starting salary for a research associate in the UK is roughly £31,000 and is heavily influenced by the region and institute you work in, e.g., London institutes will often pay much higher. Senior progression can lead to upwards of £50,000, but again this is also influenced by region. Industrial salaries are much more competitive, with starting salaries for individuals at a research associate level (post PhD) potentially being higher than £50,000.