

CAREERS THROUGH MATHS: BIOMEDICAL ENGINEER



Biomedical Engineers use mathematics to solve complex problems and drive innovation. (Image Source: Unsplash)

JOB OVERVIEW

A Biomedical Engineer applies engineering principles and problem-solving methodologies to biology and medicine. This role is central to the design, development, and maintenance of medical devices, equipment, and software used in healthcare. A typical day might involve collaborating with clinicians at an NHS Trust to identify a need, such as improving a diagnostic device, followed by designing prototypes, conducting rigorous testing, and analysing performance data. The work environment is highly varied, ranging from research laboratories in universities and institutions like the Francis Crick Institute, to the R&D departments of medical technology companies such as Smith & Nephew or GE Healthcare, and clinical settings within the NHS where equipment is installed and maintained. Key duties are diverse and technically demanding.

KEY MATHS APPLICATIONS

Primary Areas:

- **Differential Equations and Modelling:** Biomedical engineers use ordinary and partial differential equations to create dynamic models of biological systems.
- **Statistics and Data Analysis:** This is crucial for validating the safety and performance of medical devices. Engineers use statistical methods like hypothesis testing and regression analysis...
- **Linear Algebra:** This branch of mathematics is fundamental to medical imaging. Techniques like Magnetic Resonance Imaging (MRI) and Computed Tomography (CT) rely heavily on...

ESSENTIAL SKILLS & TOOLS

SKILL	APPLICATION
Mathematical Modelling Software (e.g., MATLAB/ Simulink)	The industry standard for prototyping algorithms, analysing data, and developing...
Software (e.g., ANSYS, Abaqus)	distribution on a new knee implant design under load, mathematically predicting its...
Technical Communication	Essential for presenting complex mathematical findings and design rationales to...

TYPICAL PATHWAY

The most common route is to complete a degree (BEng or MEng) in Biomedical Engineering or a related field (e.g., Mechanical/Electronic Engineering with a biomedical specialism) accredited by the Institution of Mechanical Engineers (IMechE) or the Institution of Engineering and...

INDUSTRY DEMAND

The demand for Biomedical Engineers in the UK is strong and growing. The Office for National Statistics (ONS) projects growth in the "Science, Engineering, and Technology" sector, driven by an ageing population, technological advancement,...

REAL-WORLD IMPACT

Biomedical Engineers in the UK have a direct impact on patient care and public health. They contribute to groundbreaking projects, such as the development of the NHS COVID-19 ventilator systems during the pandemic or the advanced...

QUICK FACTS

- **Education:** A-levels (or Scottish Highers) in Mathematics and Physics, often with a further science
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