

# Opening Doors

## Mathematics Careers and Degrees

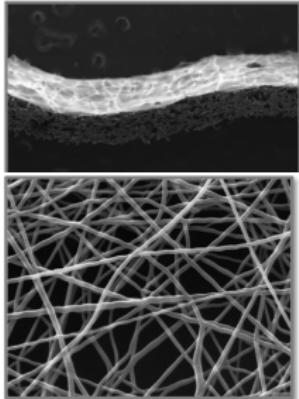
Dr Craig McNeile  
[craig.mcneile@plymouth.ac.uk](mailto:craig.mcneile@plymouth.ac.uk)  
Centre for Mathematical Sciences



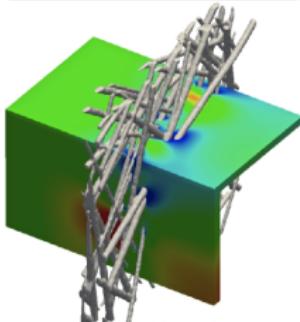
UNIVERSITY OF  
**PLYMOUTH**

# The Many Branches of Mathematics

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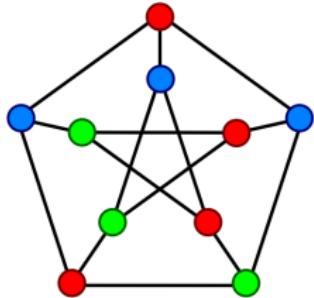
► Applied Mathematics:  
calculus is its language; fluids to finance



Courtesy Mahle GmbH, Stuttgart

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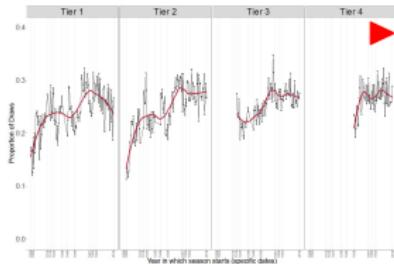
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- ▶ Pure mathematics:  
*underlying structures and symmetries*



Picture: <https://bit.ly/2VzUMHM> (public domain)

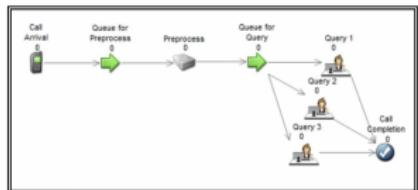
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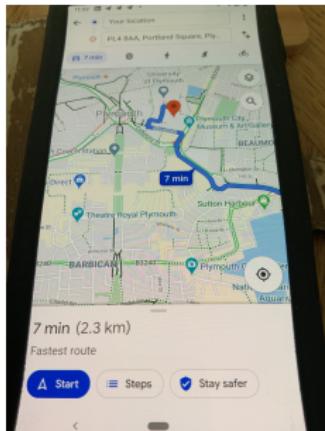
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- ▶ **Communication skills!**

# Mathematics Makes You Very Employable

Professional experience is so important . . . but so is mathematics

*"When I left Condé Nast, they advertised for a new intern and changed the job description to ask candidates to have a maths/statistics based degree with a good understanding of Excel. This was changed after I had worked with them and they then realised how much a maths graduate could bring to the company."*

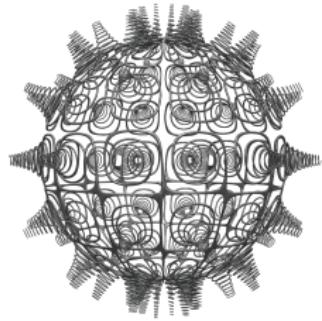
Rebecca Ruane  
Analytics Manager  
Guardian News & Media



(A demonstrable impact on intern recruitment.)

# Contents?

- ▶ First year partly what you expect (calculus, vectors, matrices).
- ▶ Much more rigour (proof).
- ▶ More choice in final year.
- ▶ Assessment: generally 60-80% exam, plus coursework (CW). Some CW-only modules.



*"My final year project on quantum computing helped me to show my technical awareness and show that I was looking at some of the leading research in computing at the time."*

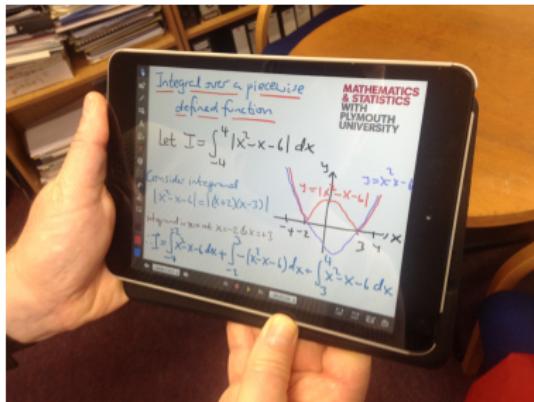
Duane Appleby, IT Specialist IBM

# Student Support



- ▶ Support classes (tutorials, PALS)
- ▶ Personal tutor system
- ▶ Drop in centres
- ▶ Approachable lecturers
- ▶ 15 hours of classes (lectures, computer labs etc.) per week.
- ▶ Employability sessions delivered by professional Careers Advisors

# Student Support



Technology to help teaching and learning:

- ▶ lecture notes
- ▶ lectures are recorded
- ▶ podcasts (by staff and students)
- ▶ voting/instant feedback

# A Track Record of Satisfied Students



Teaching Excellence Framework

## Consistent high scores for students' satisfaction. Guardian Mathematics League Table

- ▶ 2023: **2<sup>nd</sup>** satisfaction with Mathematics teaching.
- ▶ 2022: **6<sup>th</sup>** satisfaction with Mathematics teaching.
- ▶ 2021: **8<sup>th</sup>** satisfaction with Mathematics teaching.
- ▶ 2020: **4<sup>th</sup>** overall in the UK.

**85 %** of mathematics graduates, from this school, were working in a graduate jobs after 15 months (Guardian league table 2023)



# Placements and Careers

Year long placements (typically earn £20 k)

- ▶ Employers include:
  - ▶ Mastercard
  - ▶ Glaxo-Smith-Kline, Eli Lilly...
  - ▶ ONS, DSTL
- ▶ Very successful on return

Other placements

- ▶ Summer placements in industry.
- ▶ Our School runs a summer internship scheme for undergraduate research projects (£2 k)
- ▶ School placement module

Careers fairs

- ▶ Events and talks
- ▶ E.g., our own Maths Careers



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Almost any!

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- ▶ Daniel Palomeque: Senior Actuarial Analyst, Zurich Australia

# Medical Research and Development

Evidence-based medicine requires statistics



*Jenny Lannon*  
Principal Statistician  
NHS Blood and  
Transplant



*Shaun Bedford*  
Associate Global Trial  
Director  
Novartis, IQVIA



*Milensu Shanyinde*  
PhD at UCL  
Senior Medical  
Statistician  
at CTU Oxford

# The Financial World



*"The most useful aspect of a Mathematics degree  
is the problem solving skills you acquire."*

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Chartered accountant, winner of International  
Order of Merit for Financial Accounting

Charlotte Wells  
Manager, Francis Clark LLP



# Industry and Engineering

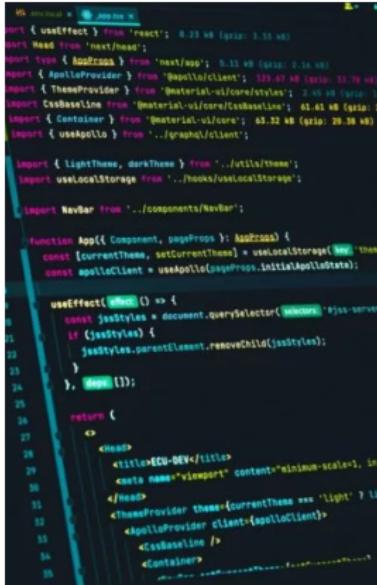
Tomasz Szyrowski

PhD in Marine Engineering

- ▶ Mathematical modelling of how to detect undersea cables
- ▶ Brand new approach (using Monte Carlo techniques)
- ▶ Scientific Software Developer at the Met Office
- ▶ Lead Software Engineer at HMRC



# Computing



```
45  import { useState } from 'react';
46  import Head from 'next/head';
47  import type { ApolloSSR } from 'next/app';
48  import { ApolloProvider } from '@apollo/client';
49  import { ThemeProvider } from 'material-ui/core/styles';
50  import CssBaseline from 'material-ui/core/CssBaseline';
51  import Container from 'material-ui/core/Container';
52  import { useApolloClient } from '@apollo/client';
53
54  import { lightTheme, darkTheme } from './utils/theme';
55  import useLocalStorage from './hooks/useLocalStorage';
56
57  import Navbar from '../components/Navbar';
58
59  function App({ Component, pageProps }: ApolloSSR) {
60    const [currentTheme, setCurrentTheme] = useState('light');
61    const apolloClient = useApollo(pageProps.initialApollo);
62
63    useEffect(() => {
64      const jsStyles = document.querySelector(`#${currentTheme}-server`);
65      if (jsStyles) {
66        jsStyles.parentElement.removeChild(jsStyles);
67      }
68    }, [currentTheme]);
69
70    return (
71      <>
72        <Head>
73          <title>ECU-DEV</title>
74          <meta name="viewport" content="minimum-scale=1, initial-scale=1, width=device-width, height=device-height, user-scalable=no" />
75        </Head>
76        <ThemeProvider theme={currentTheme === 'light' ? lightTheme : darkTheme}>
77          <ApolloProvider client={apolloClient}>
78            <CssBaseline />
79            <Container>
80              ...
81            </Container>
82          </ApolloProvider>
83        </ThemeProvider>
84      </>
85    );
86  }
87
88  export default App;
```

Peter von Holz  
Bioinformatics Scientist, GSK

*"Programming is logic-based.*

*While on my placement in BAE, I was commended for my fast learning capabilities, as I became proficient in JavaScript over the course of the placement, as well as my ability to solve complex problems.*

*Then, I was able to demonstrate my skills in a coding challenge given to me during the application process in GSK."*

# Climate



*"My degree gave me an essential introduction to numerical mathematics and mathematical programming which are the basis of modern applied mathematics in all industries."*

Peter Jermey, **Met Office**

## Final year projects

There is a lot of academic content in the degree. For example, below are a few titles of final year projects.

- ▶ Learning Phases of Matter with Neural Networks.
- ▶ Algebraic solutions of the hypergeometric equation.
- ▶ Elliptic Curve Cryptography: A Mathematical Arms Race.
- ▶ Differential geometry and Einstein's Field Equations.
- ▶ Using Machine Learning to Diagnose Pneumonia from Covid-19 in Patients from Chest X-Rays



After inventing calculus, mechanics and gravitation, Sir Isaac Newton became the warden of the Royal Mint.

# Summary

Mathematics is beautiful and helps you understand the world around you. But it also opens doors to exciting and well paid careers:

- ▶ Mathematics degrees keep more options open
- ▶ Lots of support during your studies (modern technology)
- ▶ Students enjoy our degrees (NSS, Guardian)
- ▶ They lead to well paid and extremely interesting jobs

