Numbas at Newcastle

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NUMBAS

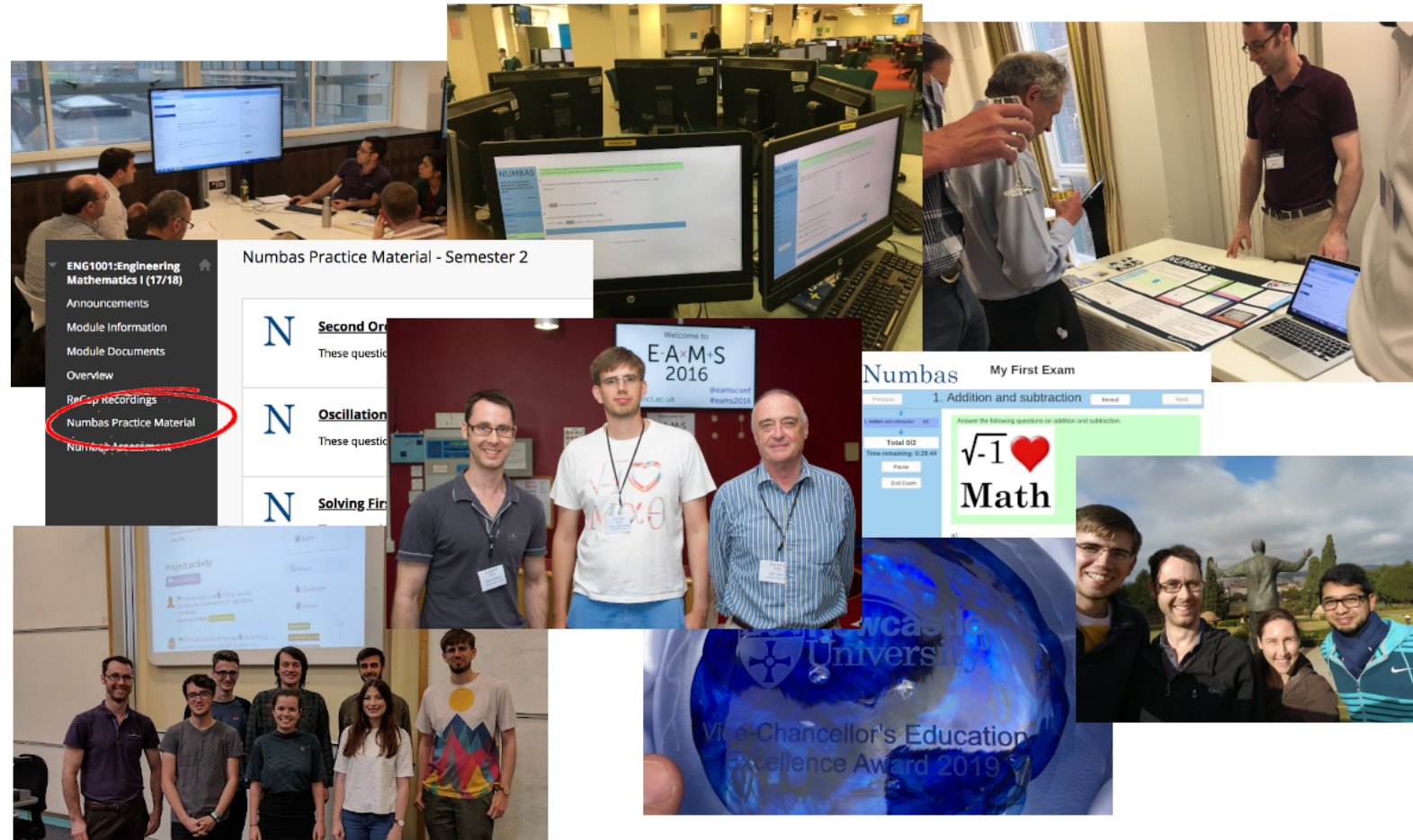Collaborative Award for Teaching Excellence 2020

Xrun

In this talk

A very broad overview of Numbas use at Newcastle University (UK).

Who is using Numbas and how.

Some observations of recent activity and trends here.

10+ Years of Numbas at Newcastle

E-Learning Unit

Team of 4(ish) dedicated to supporting technology-enhanced teaching and learning in our School of Maths, Stats & Physics.

Newcastle University

Faculty of Science, Agriculture & Engineering

School of Maths, Stats & Physics

E-Learning Unit

Numbas use by subject

Accounting Biomedical Sciences Business Chemistry Computing Economics Engineering INTO Mathematics & Statistics Physics Psychology Sports Science Surveying

Numbas use by school

Numbas in G100

	Transition material			
Stage 1	MAS1605	MAS1606	MAS1607	MAS1608
	MAS1701	MAS1702	MAS1803	MAS1902

Numbas in G100

Stage 1	Transition material			
	MAS1605	MAS1606	MAS1607	MAS1608
	MAS1701	MAS1702	MAS1803	MAS1902

Stage 2				
	MAS2702	MAS2703	MAS2707	MAS2803
	MAS2804	MAS2806	MAS2903	MAS2904	MAS2906

Numbas in G100

Transition material			
Stage 1			
MAS1605	MAS1606	MAS1607	MAS1608
MAS1701	MAS1702	MAS1803	MAS1902

Stage 2				
MAS2702	MAS2703	MAS2707	MAS2803	
MAS2804	MAS2806	MAS2903	MAS2904	MAS2906

Stage 3					
MAS3701	MAS3702	MAS3705	MAS3706	MAS3707	MAS3708
MAS3802	MAS3804	MAS3808	MAS3809	MAS3810	MAS3815
MAS3902	MAS3904	MAS3804	MAS3905	MAS3907	MAS3909
MAS3911	MAS3913				

Module example I

MAS1607, moderate use

- Numbas practice sets organised by topic
- Two hybrid in-course summative assessments (Numbas 50%).

Module example II

MAS1803, high use

- Weekly practical handout questions
- Weekly Test Yourself practice questions
  - Warm up
  - Week's content
  - Bonus questions
- Two hybrid in-course summative assessments (Numbas ~60%)
- Mock and final exam

Preparing questions

Pre-Covid, the E-Learning Unit (mostly) prepared Numbas questions on behalf of module leaders.

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Step change at the start of Covid:

- Lecturers often now write their own material
- Postgraduates employed to develop material instead of marking

Applications of Numbas

Numbas is used throughout the student life-cycle in a number of different applications (each one probably a 15 min talk!)

- Pre-entry course and examination
- Transition material
- Diagnostic tests
- Maths support
- Module practice material
- Laboratory/practical material
- In-course assessments
- Final exams

Some recent trends

Hybrid assessments

Numbas and manual marking to enable more efficient, focussed marking.

$v(0) = v_0 > 0$ and as long as $v > 0$ it is subject to two forces, a friction force $F_r^1 = -\mu mg$ with friction coefficient $\mu > 0$ and constant gravitational acceleration g, and a linear air resistance force $F_r^2 = -\gamma v$ with linear air resistance constant $\gamma > 0$. When $v = 0$ both forces vanish and the block of mass comes to rest.

Hint: You can enter v_0 as "v_0", γ as "gamma" and μ as "mu".

s exam

10 marks
Unanswered

10 marks
Unanswered

15 marks
Unanswered

15 marks
Unanswered

7 marks
Unanswered

7 marks
Unanswered

10 marks
Unanswered

13 marks
Unanswered

13 marks
Unanswered

3:59:27

a)

The net force is given by,

$F = \boxed{}$

Use this to formulate an ordinary differential equation for the velocity $v(t)$.

$\dot{v} = \boxed{}$

Submit part

1.5 marks

Unanswered

b)

Solve the differential equation to find $v(t)$.

☐ I have written an answer to submit through Canvas

Submit part

Programming extension

More on Wednesday!

Solve the logistic equation using the Euler Method with the following specification:

- $r = 0.5$
- $x_0 = 0.2$
- Create an array x with 21 $x(t)$ values.
- The x values should correspond to 21 linearly spaced t values in the range $0 \leq t \leq 10$ ($h = 0.5$)

```python
 1  import numpy as np
 2
 3  def rhs(t,x):
 4      ''' returns the RHS of the logistic ODE'''
 5      return 0.5*x*(1-x)
 6
 7  # Initialise the arrays
 8  t = np.linspace(0,10,21)
 9  x = np.zeros(21)
10  x[0] = 0.2
11
12  # Solve using Euler
13  for n in range(0,20):
14      x[n+1] = x[n] + (t[n+1]-t[n])*rhs(t[n],x[n])
```

Write Python code ✔

Submit part

✔✔ Your code runs without errors.

Test: Correct x array

✔✔ This test was passed. You were awarded 1 mark.

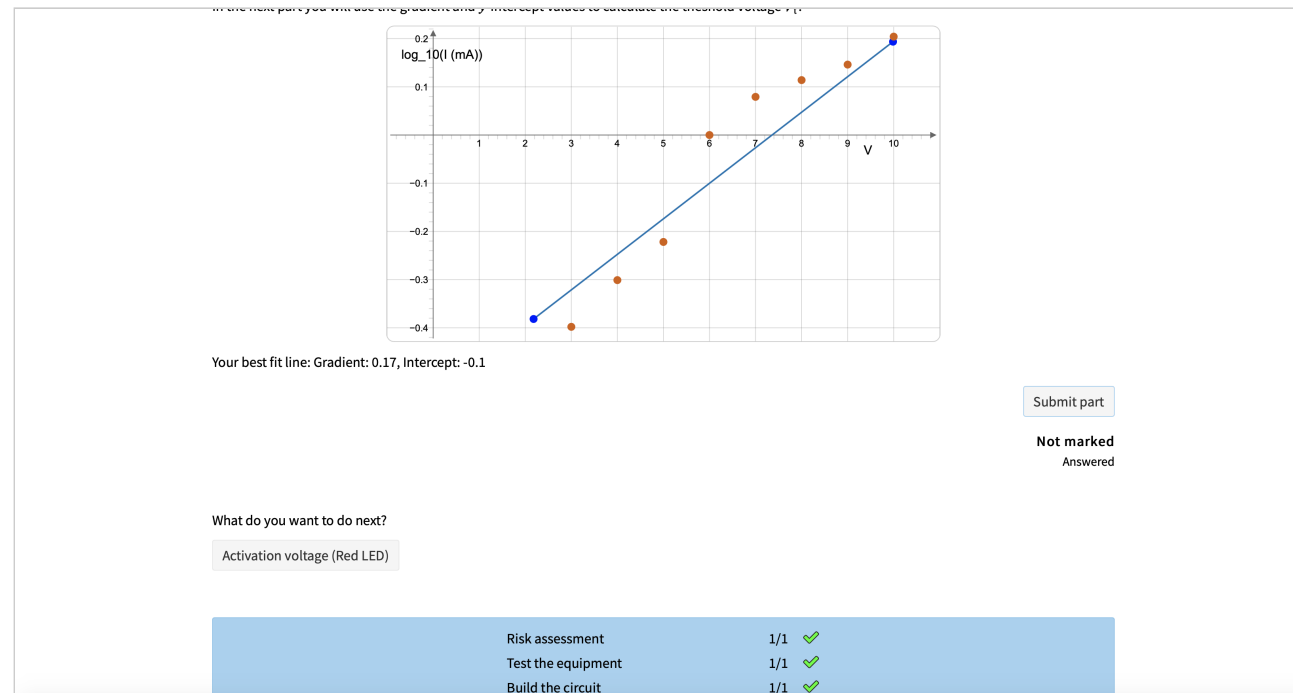You scored 1 mark for this part.

Score: 1/1 ✔

Explore mode

Adaptive marking became an unlikely contender for doing laboratory experiments!

Explore mode

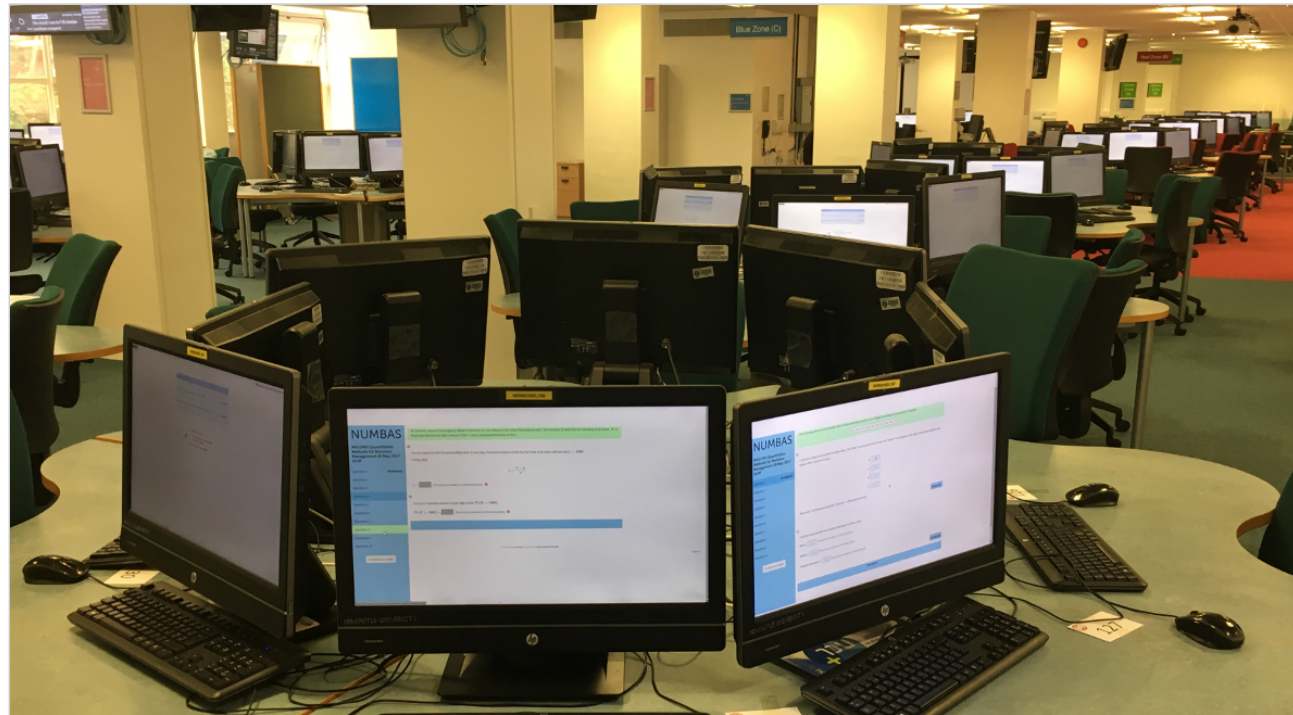Adaptive marking became an unlikely contender for doing laboratory experiments!

Explore mode more naturally accomodates lab and practical activities.

Exams

Pre-Covid we ran a very small number of in-person exams.

We use a "Numbas application" to deliver exams in a locked-down browser.

Evolution of exams

2019/20: all semester 2, stage 1 exams in Maths, Stats & Physics moved online (pass-fail format).

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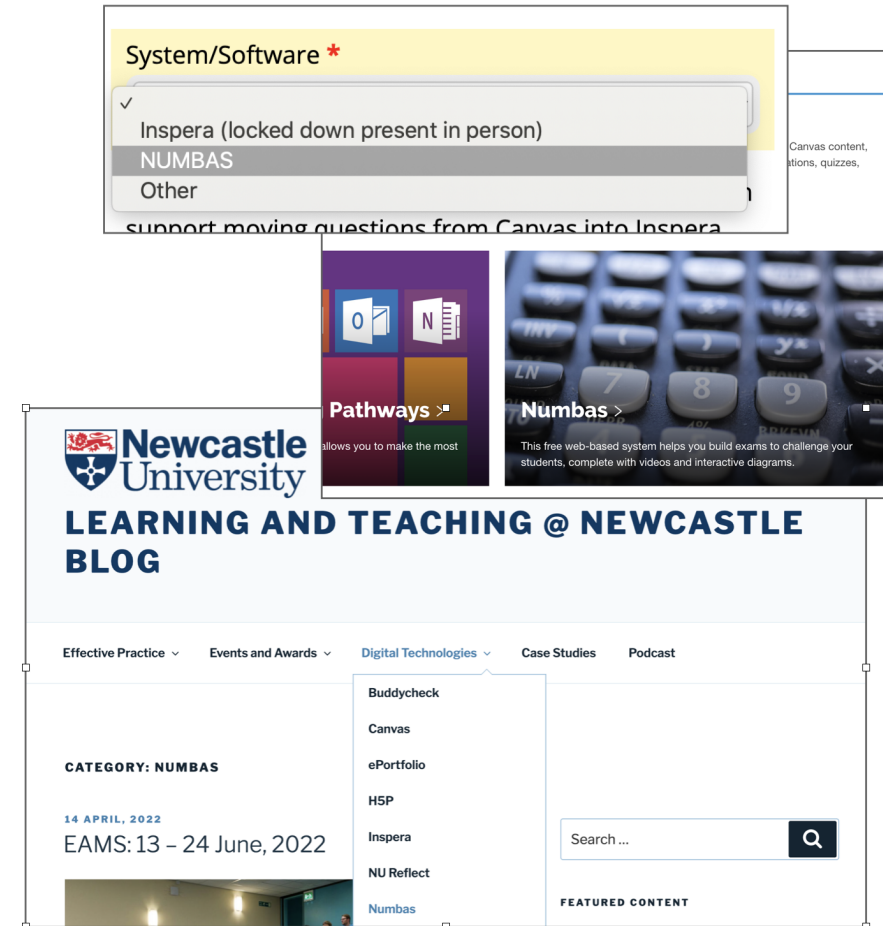
This year: ~20 exams planned in-person using a combination of our University lock-down exam system Inspera and Numbas.

Institution support

Has taken a long time to develop.

What has helped:

- Working with other departments
- Working with our central learning and teaching team
- Sitting on committees and working groups
- Applying for small teaching grants and awards

Later this week

More talks related to Numbas @ Newcastle:

- Later today:

    - From CALM to Numbas

- Wednesday:

    - The programming extension
    - Longer computational question setting and marking using Numbas

- Thursday:

    - Numbas for Chemistry

Thank you!

Thanks for listening.

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