Welcome to Math 102 - Calculus for Life the Sciences

- Instructor: Prof. Eric Cytrynbaum

- Email: cytryn@math.ubc.ca

- Course website: wiki.math.ubc.ca

- Today:

  - Information about the course.

  - A little experiment on learning.

  - Shapes of cells and power functions.

Math 102 - info

- Homework:
  - WeBWorK (online) - 15%
  - Old-School Homework (written) 5%
- Midterms (Sep 30, Nov 4 @ 6pm) - 30%
- Final exam - 50% ("44% rule")

Math 102 - info

- WeBWorK -

  - Pre-lecture (MWF 7am - starting F!), post-lecture (Th 7am - next week).

  - 5%-drop rule (by points).

- OSH 1 - due Monday!!

  - Communicating mathematics.

- Getting help - Piazza, MLC, office hrs.

Math 102 - info

- DO LOTS OF PROBLEMS.

- Solutions:

  - WW - immediate yes/no.

  - OSH - you'll get solns.

  - Text - answers at the back, no solns.

  - Anything else - exam training (no solns).

Math 102 - info

- Course notes - by Leah Keshet (pdfs on course website)

- Online mini-lectures (videos) for pre-lecture assignments.

- Read over website - lots of info there, "Course logistics" assignment.

- A quick view of the course site, Piazza, WeBWorK...

Math 102 - info

- In class, you will be expected to actively think and work!

- I will use a short lecture format with lots of clicker questions.

Studying tips

- Learning theory is useful for guiding your studying decisions.

- Experiment - write your name, where you were born and what you plan to major in on a piece of paper and pass it to someone you don't know sitting near you.

- Read the info and try to remember it. Give the paper back to your neighbour.

Shapes of cells
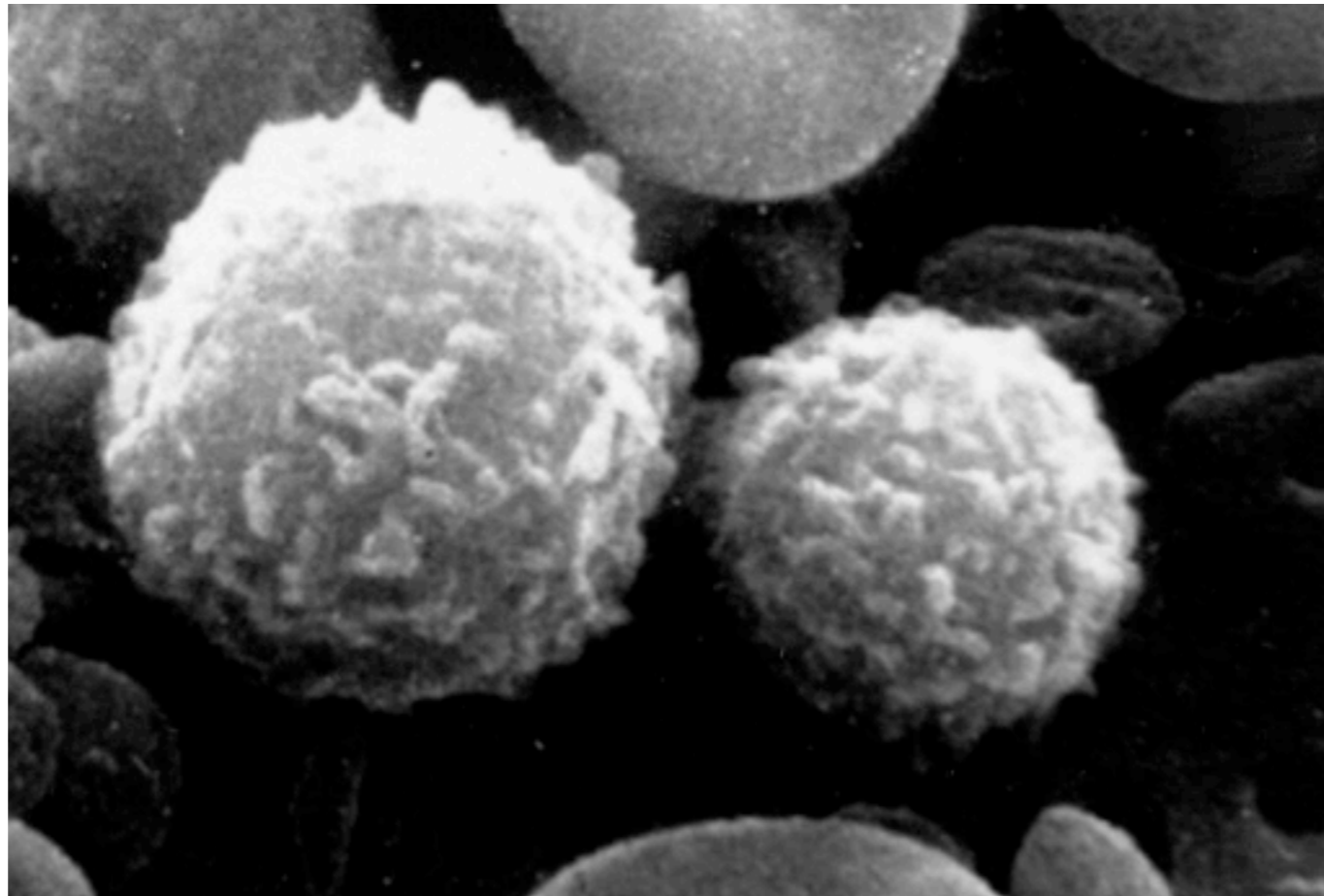
White blood cells (spheres)

Shapes of cells

- Cellular metabolism - cells use energy/ nutrients proportional to volume but absorb them proportional to surface area.

- Need absorption rate > consumption rate to survive.

- For different shapes, this balance scales better or worse as size increases...

Nutrient balance in a spherical cell

- Absorption is proportional to surface area:

$$S = 4\pi r^2 \qquad A = k_1 S = 4k_1 \pi r^2$$

- Consumption is proportional to volume:

$$V = \frac{4}{3}\pi r^3 \qquad C = k_2 V = \frac{4}{3}k_2 \pi r^3$$

where k_1 and k_2 are positive constants.

Back to the experiment

- Left side of room - show your piece of paper to your neighbour and let them read over it again.

- Right side of room - do not show your neighbour the paper again but ask them to repeat the info as best they can. After they do so, show them the paper.