JOHN HAY BIOMEDICAL · HUMAN BODY SYSTEMS · SPRING 2027

# What We Hope The Year Will Be Like

*An imagined semester of Human Body Systems, written as a letter home from a student who does not exist, describing the year we are building toward.*

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PLEASE READ THIS FIRST

**This is fiction.** There is no such student. Nothing here is a record of anything that has happened, and no real student, family, grade, or conversation appears anywhere in it.

It is a hope, written in the first person because that is the honest way to describe what a course is supposed to feel like from the inside. The lessons, labs, and assignments are the real planned curriculum. The student, the classmates, the group arguments, the mistakes, and the feelings are invented to show what the plan is meant to produce.

**About the partner activities.** The Cleveland Clinic onboarding and rotation, the John Carroll ethics Mondays, the research morning, and HOSA events appear here as part of the year we are planning. None of them is confirmed yet. Partner schedules are set outside this building, and any of these may move, change shape, or not run at all. Treat every partner activity in this document as an intention, not a promise.

You asked what this class actually is, so I am writing it down. All of it, every day, from the first one.

WHY I SIGNED UP

I want to be a nurse. Not a doctor, a nurse, and I am tired of people treating that like the smaller version of the same wish. The nurse is the one who is actually in the room. When my uncle was recovering, the doctor came in for four minutes a day and the nurse was there the whole time, and she was the one who noticed the thing that mattered.

So I took Human Body Systems, which is the class where you learn the body one system at a time and then have to prove you understand it with evidence.

The rhythm is the same every week once you see it. Monday we argue about an ethics question. Tuesday we learn the content. Wednesday we are in the lab with our hands on something. Thursday we analyze whatever we measured. Friday we hand in the whole week as one packet. Seventeen weeks, one system at a time, same shape every time.

## Week 1 · Orientation · January 19 to 26

How the class works, before any of the anatomy starts.

### TUE JAN 19 Welcome, expectations, and how this class works

First day, and he did not hand out a syllabus and read it to us. He put a case on the board, asked what we would need to know to solve it, and let us list things for ten minutes. Then he said the list we just made was the course.

The expectations are short enough to remember. Come in ready, write it down, say where your evidence stops. That last one is going to come up constantly.

> **Turned in:** exit ticket → Exit Tickets folder

### WED JAN 20 How to use the class website

We walked the site: where the day's lesson lives, where the glossary is, where the folder for each kind of work is. Everything I turn in this semester goes to one of a small number of folders, and now I know which is which.

The part I did not expect was the practice section. It is not extra, it is where the WebXam review lives, and it is open from day two.

> **Turned in:** exit ticket → Exit Tickets folder

### FRI JAN 22 Cornell notes and the 6 Rs

Record, Reduce, Review, Reflect, Recite, Revise. We set up the notebook the way it will stay all semester: notes on the right, questions on the left, summary at the bottom.

He made us do the Reduce step on notes we had just taken, which was uncomfortable, because it showed how much of what I wrote down I could not actually say back.

> **Turned in:** notebook page → Lab Notebooks folder

### MON JAN 25 Lab safety, myPLTW, and how to submit

Safety first, and not as a formality. Personal protective equipment, the Safety Data Sheet, and finding the hazard and first aid sections on a real chemical before anyone touched anything. He calls it earning entry to the lab, and that framing works on me.

Then myPLTW logins and a practice submission, so the first real one is not also the first time I have used the system. The Maniken is already on the bench and we are not allowed to touch it yet.

> **Turned in:** safety agreement and practice submission → Class Records

### TUE JAN 26 **WebXam pretest and goal setting**

The pretest is a baseline, not a grade, and he said that before he handed it out and again after. Mine was low and so was everybody's, which was the point.

Then we wrote down a target and one specific habit to get there. Mine is fifteen minutes a night on the practice section. Seventeen weeks to move it.

> **Turned in:** WebXam practice → recorded in Class Records

## Week 2 · January 28 to February 4

Unit: launch. Who owns a body, and how do we talk about one.

### THU JAN 28 Bioethics: who owns a body? ETHICS DAY

First day and we went straight into it. Should medical students learn anatomy on donated human bodies, or only on simulations? I said donated bodies obviously, because a simulation cannot surprise you and a real one can.

Then someone asked whether the family gets a say after the person has died, and whether consent given years ago still counts when the body is in the room. I did not have an answer. We wrote our first CER, which is Claim, Evidence, Reasoning, and mine was mostly claim.

Mr. Mendoza said the whole year runs on real bodies and real data, and that the ethics question comes first every Monday for that reason, not as a warm-up.

> **Turned in:** CER → Claim Evidence Reasoning folder.

### FRI JAN 29 Anatomy vs physiology, homeostasis

Anatomy is structure, physiology is function. Then homeostasis, which is the body holding itself steady, and the negative feedback loop that does it: stimulus, sensor, control, effector.

I drew the thermoregulation loop. You get too hot, the sensor notices, the control center decides, the effector sweats. What got me is that the loop turns itself off once it works. The correction removes the reason for the correction. That is the whole design of the body in one diagram.

> **Turned in:** labeled feedback loop → Lab Notebooks folder.

### MON FEB 1 Lab notebook and safety practical LAB

Notebook setup and the safety practical. Sections for objective, data, analysis, reflection, and page one dated. Then we had to physically locate the eyewash, the sharps container, and the SDS binder, because knowing where they are on a diagram is not the same as knowing where they are when something has gone wrong.

The SDS checklist is sections 2, 4 and 8: hazards, first aid, protection. I had to look up a real chemical and find all three.

> **Turned in:** SDS checklist and notebook photo → recorded in Class Records.

### WED FEB 3 Anatomical directional terms

Superior and inferior, anterior and posterior, medial and lateral, proximal and distal. Paired terms, always relative to anatomical position.

This looked like vocabulary busywork until he made the point that the entire field depends on it. If you say the injury is above the knee, above depends on whether the patient is standing or lying down. If you say proximal to the knee, it means the same thing in every position. The language exists to remove ambiguity, not to sound clinical.

> **Turned in:** labeled body outline → recorded in Class Records.

AT HOME, THE NIGHT BEFORE THU FEB 4

### Submit launch evidence

First packet: homeostasis loop, safety checklist, directional terms, all checked against the rubric for dating and labels. Undated work does not count, which sounds harsh and is exactly how a real chart works.

> **Turned in:** week one packet → recorded in Class Records.

THAT WEEK AT HOME

Light week. Twenty minutes a night setting up the notebook and drilling the directional term pairs, which are pure memorization and will be on the WebXam.

He told us on day one that the students who struggle are almost never the ones who cannot understand it, they are the ones who met the content once in January and never went back. So the fifteen minutes a night starts now, not in November.

## Week 3 · February 4 to 11

Unit: body organization. Planes, cavities, tissues.

AFTER SCHOOL · SIGNING UP

Club sign-ups. I put my name down for HOSA, which is the health professions student organization and the one that actually connects to what I want to do. Chess, because my friend would not stop asking. And I asked about the Cleveland Clinic onboarding, because there is a pathway where students do a rotation there.

He said the Clinic onboarding is real paperwork with a real background check and it takes weeks, so start now. That is the first time school has felt connected to an actual hospital.

### THU FEB 4 Bioethics: imaging and privacy ETHICS DAY

Should a hospital use real patient scans to teach students without asking permission again? The scan was taken for care. Teaching is a different purpose.

I argued yes, because the images are anonymized and the educational benefit is real. The pushback was that a scan can carry identifying information in ways people do not expect, and that anonymized is a claim someone has to actually verify. I still lean yes. I hold it less confidently than I did at the start of the period.

> **Turned in:** CER → Claim Evidence Reasoning folder.

### FRI FEB 5 Body planes and cavities

Sagittal, frontal, transverse. Then the dorsal and ventral cavities and what lives in each.

The reason this matters is imaging. Every scan is a slice along one of those planes, so if you cannot name the plane you cannot say where you are looking. I labeled a diagram and placed one organ in each major cavity.

> **Turned in:** planes and cavities diagram → Lab Notebooks folder.

### TUE FEB 9 Tissue types and organization model BUILD

Four primary tissues: epithelial, connective, muscle, nervous. Every structure in the body is built from combinations of those four, arranged from cell to tissue to organ to system to organism.

We built a model card showing all five levels. Doing it as an object rather than a list made the hierarchy stick, because you have to decide what sits inside what.

> **Turned in:** organization model photo → Lab Notebooks folder.

### WED FEB 10 Patient anatomy map

First time we applied the vocabulary to a person. A patient scenario with an injury site, and we had to mark the body region, the cavity, and the plane that best describe where it is.

This is the bridge he keeps talking about. Two days ago these were words. Today they are how you tell another clinician where to look.

> **Turned in:** annotated anatomy map and CER → Claim Evidence Reasoning folder.

AT HOME, THE NIGHT BEFORE THU FEB 11 **Submit organization evidence**

Planes diagram, organization model, patient map. I was missing labels on the model photo and had to redo the picture, which is a two-minute problem that becomes a zero if you do not check.

> **Turned in:** week packet → recorded in Class Records.

THAT WEEK AT HOME

Around thirty minutes a night. The four tissue types and the three planes are flat memorization so they went on cards immediately.

Weekend I went back over the feedback loop from week one, because the whole course is going to keep using it and I could already feel it getting fuzzy.

## Week 4 · February 11 to 19

Unit: the skeleton. Bone as living tissue.

### THU FEB 11 Bioethics: bone donation and 3D parts ETHICS DAY

When bone graft material is scarce, who gets it first? We had to name an actual allocation rule and then defend it, which is harder than saying it should be fair.

Sickest first, most likely to benefit, first come first served, youngest first. Every one of them sounds reasonable until you follow it to the case where it produces something you cannot accept. That is the point of making us pick one.

> **Turned in:** CER → Claim Evidence Reasoning folder.

### AT HOME, THE NIGHT BEFORE WED FEB 17 Bone cells and bone structure

Osteoblasts build, osteoclasts break down, osteocytes maintain. Bone is not a rock, it is a tissue being continuously demolished and rebuilt by three cell types that have to stay in balance.

Then compact bone with its osteons against spongy bone with its trabeculae, in a two-column chart. The structure matches the mechanical demand, which is a theme I am starting to notice everywhere in this class.

> **Turned in:** bone cell summary and comparison chart → recorded in Class Records.

### WED FEB 17 Fracture analysis lab LAB

X-rays and fracture models. Greenstick, transverse, comminuted, spiral. We had to classify each break, name the nearest joint type, and describe the position using the directional terms from week one.

The spiral fracture is the one I will remember, because the pattern tells you the force was rotational. The bone records how it was broken. You are reading an event that already happened.

> **Turned in:** fracture classification table → Data Tables folder.

### THU FEB 18 Bone repair and repair tech

Four stages of healing: hematoma, soft callus, hard callus, remodeling. Then matching each stage to the bone cells doing the work, which ties straight back to Tuesday.

The CER was about when a plate or screw is worth it versus letting the bone heal on its own. My claim was fine and my reasoning sentence just restated it. That is apparently the most common mistake and I have now made it twice.

> **Turned in:** repair timeline and CER → Claim Evidence Reasoning folder.

### AT HOME, THE NIGHT BEFORE FRI FEB 19 Submit skeletal evidence

Bone cell chart, fracture table, repair CER.

> **Turned in:** skeletal packet → recorded in Class Records.

THAT WEEK AT HOME

Thirty five minutes a night. Fracture types went on cards with pictures, because naming them from a list is easy and recognizing them from an image is the actual skill.

Weekend was the three bone cells until I stopped mixing up blast and clast. The trick that finally worked: clast sounds like blast apart.

## Week 5 · February 19 to 25

Unit: muscles. The Maniken build starts.

### FRI FEB 19 Bioethics: performance enhancement ETHICS DAY

Should athletes be allowed drugs that build muscle faster? I said no and got asked why training at altitude is fine but a drug is not, since both are deliberate manipulation of physiology.

I did not have a clean line. The best I got to was that one carries a health cost the athlete may not be able to refuse if everyone else is taking it. That is a coercion argument, not a fairness argument, and it is a better one than what I walked in with.

> **Turned in:** CER → Claim Evidence Reasoning folder.

### AT HOME, THE NIGHT BEFORE TUE FEB 23 Sarcomere and contraction

The sarcomere. Actin and myosin, Z-lines, A-band, I-band, and the sliding filament model.

Every voluntary movement you have ever made is filaments ratcheting past each other. The muscle does not contract by shrinking, the filaments slide across each other and the whole thing gets shorter. I labeled the diagram three times before the bands were in the right places.

> **Turned in:** labeled sarcomere diagram → Lab Notebooks folder.

### TUE FEB 23 Maniken muscle build BUILD LAB

This is the one people told me about. You roll actual clay muscles and place them on a skeleton model, in anatomical order, from origin to insertion.

It is much harder than it sounds. You cannot place a muscle correctly unless you know which bone it pulls from and which bone it moves, and if you build a layer in the wrong order you have to take the top ones off to fix it. I put a muscle on backwards and my partner caught it because the action would have been impossible.

Photographing anterior and posterior views with every muscle labeled is the deliverable.

> **Turned in:** labeled Maniken build photos → Lab Reports folder.

### WED FEB 24 Muscle action analysis

Agonist, antagonist, synergist. Nothing in the body moves by one muscle contracting. One pulls, one resists, others stabilize, and the resistance is what makes the movement controlled instead of a spasm.

I picked elbow flexion and traced the pair. Then I had to revise my Maniken label card, because analyzing the movement showed me I had labeled one insertion wrong on Wednesday.

> **Turned in:** agonist analysis and revised label card → Lab Notebooks folder.

AT HOME, THE NIGHT BEFORE THU FEB 25 **Submit muscle evidence**

Sarcomere diagram, Maniken photos, muscle pair analysis. The packet works across scales, from filaments sliding to a whole joint moving, which is the point of the week.

> **Turned in:** muscle packet → recorded in Class Records.

THAT WEEK AT HOME

Closer to forty five minutes, mostly redoing the sarcomere diagram and relabeling the Maniken photos.

Weekend I rebuilt the sliding filament explanation out loud until I could say it without the diagram. That is the Recite step and it is the only reason I know it now.

## Week 6 · February 25 to March 3

Unit: motion data. Sensors, EMG, and real measurement.

AFTER SCHOOL · HOSA

First real HOSA meeting. We are choosing competitive events and I am looking at the one on medical terminology, partly because the vocabulary overlaps almost exactly with what this class is already making me learn. Doing two things with one effort is the only way I get everything done.

Six of us are stuck on the same step of the Clinic onboarding, so we worked it together for twenty minutes. Much faster than six people being confused separately.

THU FEB 25 **Bioethics: wearable data privacy** ETHICS DAY

Should an employer be allowed to see the data from a wellness wearable they paid for? The wearable is a gift with a sensor in it.

Nobody in the room said yes. What we argued about was where the line is, because health insurance already prices risk and a wearable is just a faster way to learn the same thing. I wrote that the problem is not the data, it is that consent given for wellness gets reused for employment.

> **Turned in:** CER → Claim Evidence Reasoning folder.

AT HOME, THE NIGHT BEFORE MON MAR 1 **Muscle fatigue and EMG basics**

Electromyography. Muscles produce a measurable electrical signal when they fire, and as they fatigue the signal changes in a predictable way.

We had to sketch a prediction of what the EMG trace would look like across repeated trials before measuring anything. Predicting first, then measuring, is a different feeling than measuring and then explaining whatever happened.

> **Turned in:** labeled prediction sketch → recorded in Class Records.

MON MAR 1 **Sensor and range-of-motion lab** LAB

Real sensors, real numbers, units on everything. The EMG signal in millivolts, grip force in newtons, joint angle in degrees, multiple trials.

Our first two trials were unusable because the sensor was not seated the same way each time, so we were measuring our own setup instead of the muscle. We restarted, fixed the placement, and wrote the failed trials into the notebook anyway, because deleting them would have been the wrong instinct.

> **Turned in:** raw data table → Data Tables folder.

TUE MAR 2 **Kinesiology data analysis**

Graph of force or angle against trial number, then a CER claiming what the trend shows about fatigue.

My prediction from Tuesday was directionally right and wrong about the shape. The decline was not steady, it dropped fast and then leveled off. Being wrong in a specific way is much more useful than being vaguely right.

> **Turned in:** labeled graph and CER → Claim Evidence Reasoning folder.

AT HOME, THE NIGHT BEFORE WED MAR 3 **Submit motion-data evidence**

Raw table, labeled graph, fatigue CER, and a limitations line about the sensor placement problem.

> **Turned in:** motion data packet → recorded in Class Records.

THAT WEEK AT HOME

Forty minutes a night. Graphing with units and a labeled axis is a skill I did not have three weeks ago and now do without thinking about it.

Weekend I went back to the skeleton unit, which is two weeks old now and needs deliberate revisiting.

## Week 7 · March 3 to 9

Unit: rehabilitation. The first time a patient is a person.

WED MAR 3 **Bioethics: access to rehab** ETHICS DAY

Should insurance be allowed to cap the number of rehabilitation sessions a patient gets? The cap is not a medical judgment, it is a budget, and it lands on the person who needs the most.

The counterargument is that unlimited coverage is not actually possible and somebody has to draw a line somewhere. I hate that this is true.

> **Turned in:** CER → Claim Evidence Reasoning folder.

AT HOME, THE NIGHT BEFORE FRI MAR 5 **Empathy and patient data**

We were given a patient record and had to annotate it for diagnosis, limits, and goals. The goals column is the one that changed the week. It is not what the injury is, it is what this person wants to be able to do again.

Mine wanted to carry a grandchild. Nothing in the diagnosis tells you that, and everything about the plan depends on it.

> **Turned in:** empathy notes → Lab Notebooks folder.

FRI MAR 5 **Rehabilitation plan project** TEAM PROJECT

Teams building an actual week-by-week rehabilitation plan: two exercises, one assistive device, and a timeline.

We argued about pace. I wanted the aggressive plan because faster recovery is better recovery. My teammate pointed out that a plan the patient abandons in week two is worse than a slower plan they finish. She was right and I did not want her to be.

> **Turned in:** team rehabilitation plan card → Lab Reports folder.

MON MAR 8 **Plan revision and rationale**

Peer review, then revision with the changes documented. We had to show at least two specific changes we made because of feedback, and why.

Ours were both about pacing. Writing down that we changed our minds, and what changed them, felt like admitting a mistake and is apparently just what a revision log is.

> **Turned in:** revised plan and rationale CER → Claim Evidence Reasoning folder.

AT HOME, THE WEEKEND BEFORE TUE MAR 9 **Submit rehab evidence**

Empathy notes, original plan, revised plan, rationale. This is the first packet where the artifact is a plan for a person rather than a measurement of a thing.

> **Turned in:** rehab packet → recorded in Class Records.

THAT WEEK AT HOME

About forty minutes. Most of the plan work happened in class, but the rationale got written at home because I kept rewriting it.

Weekend was lighter on new material and heavier on review. Six weeks in, the pile of things I am supposed to still know is real, and the fifteen minutes a night is the only reason it is manageable.

## Week 8 · March 9 to 16

Unit: the nervous system. Neurons and the brain.

### TUE MAR 9 Bioethics: brain data and consent ETHICS DAY

Should brain scan data be usable for anything beyond the reason it was collected? A brain scan is closer to a person than most medical data.

Somebody made the point that a scan taken to find a tumor might also show something about cognition nobody asked to know. Consent for the first does not cover the second. That reframed it for me from privacy to purpose.

> **Turned in:** CER → Claim Evidence Reasoning folder.

### AT HOME, THE NIGHT BEFORE THU MAR 11 Neuron parts and the synapse

Dendrites, cell body, axon, myelin, terminals, with the signal direction marked. Then the synapse, where the signal stops being electrical and becomes chemical and then electrical again.

That gap is the part I keep thinking about. The signal does not actually cross. A molecule crosses, and a new signal starts on the other side.

> **Turned in:** labeled neuron diagram → Lab Notebooks folder.

### THU MAR 11 Brain dissection DISSECTION

Sheep brain. I was not sure how I would handle this and I was fine, which surprised me. Cerebrum, cerebellum, brainstem, and the texture difference between grey and white matter, which is obvious in your hands and invisible in a textbook.

One person in our group could not do it and Mr. Mendoza gave them the virtual version without making it a thing. I noticed that.

> **Turned in:** labeled brain region map → Lab Reports folder.

### FRI MAR 12 CNS, PNS, and brain regions

Sorting five body actions into central and peripheral with a justification for each. Sorting is easy, justifying is where you find out whether you understand it.

> **Turned in:** CNS and PNS sorting table → Lab Notebooks folder.

### AT HOME, THE WEEKEND BEFORE TUE MAR 16 Submit nervous-system evidence

Neuron diagram, brain map, sorting table.

> **Turned in:** nervous system packet → recorded in Class Records.

THAT WEEK AT HOME

Forty five minutes. The neuron parts and the brain regions are heavily tested and highly visual, so I drew both from memory until they were right.

Weekend I explained the synapse to you at dinner, which you probably thought was me being enthusiastic. It was the Recite step. Thank you for listening anyway.

## Week 9 · March 16 to 22

Unit: reflexes. Measuring your own nervous system.

AFTER SCHOOL · CHESS

Chess on Thursday. I am still losing, but I lost slower this time. Somebody watching pointed out that I only look at my own plan and never at what my opponent is setting up.

That is the same failure as the sensor placement in week five. I was so focused on my measurement that I never checked whether the setup was consistent.

TUE MAR 16 **Bioethics: drugs and driving** ETHICS DAY

Should a driver impaired by a legally prescribed medication be treated the same as one impaired by alcohol? They did nothing wrong in obtaining it and the effect on reaction time can be comparable.

This one split the room evenly, which almost never happens. The strongest point against my position was that the law protects other people on the road, and the road does not care why you are slow.

> **Turned in:** CER → Claim Evidence Reasoning folder.

AT HOME, THE NIGHT BEFORE WED MAR 17 **Reflex arc and myelin**

Five components: receptor, sensory neuron, integration center, motor neuron, effector. The reflex does not go to the brain first, which is why it is fast, and why you have already moved your hand before you feel the heat.

Then myelin, and why losing it slows conduction. The insulation is not decoration.

> **Turned in:** labeled reflex arc diagram → Lab Notebooks folder.

WED MAR 17 **Reaction-time lab** LAB

Measuring our own reaction times, baseline against a distraction condition, multiple trials each.

My distraction numbers were dramatically worse and I genuinely did not feel slower while doing it. That gap between how it felt and what the stopwatch said is the most convincing argument about distracted driving anybody has ever made to me, and nobody made it, I measured it.

> **Turned in:** reaction-time data table → Data Tables folder.

THU MAR 18 **Drug effects on signaling**

Bar graph of baseline against distraction, with error noted, then a CER about what it means for signaling.

The limitation I had to write is that we tested distraction, not medication, so my conclusion about drugs is an extension of the data rather than something the data shows. That distinction is the thing this class keeps drilling.

> **Turned in:** labeled bar graph and CER → Claim Evidence Reasoning folder.

AT HOME, THE WEEKEND BEFORE MON MAR 22 **Submit reflex evidence**

Reflex arc diagram, reaction time table, comparison graph, CER.

> **Turned in:** reflex packet → recorded in Class Records.

> THAT WEEK AT HOME
>
> Forty minutes. The five reflex arc components went on cards. Reaction time data got graphed twice because my first axis scaling made a small difference look enormous.
>
> Halfway point next week, so the weekend was a full pass over units one through eight.

Unit: endocrine. Chemical control, and a harder Monday.

MON MAR 22 **Hormone therapy bioethics debate** ETHICS MONDAY

Whether a minor can consent to hormone therapy. This was the most careful the room has ever been, and Mr. Mendoza set the terms first: we argue the reasoning, not the person, and nobody has to share anything about themselves.

The exit ticket asked for one sentence citing a specific consideration, not a general opinion. That constraint helped. It is much harder to be careless in one sentence you have to defend.

> **Turned in:** exit ticket → Exit Tickets folder.

TUE MAR 23 **Endocrine glands and signaling**

Four glands minimum on a body diagram with the hormone each releases. The endocrine system is the slow control system, chemical instead of electrical, and it reaches everywhere the blood does.

The comparison that landed: the nervous system is a phone call, the endocrine system is a letter to everybody at once.

> **Turned in:** annotated gland diagram → recorded in Class Records.

WED MAR 24 **Negative feedback model build** BUILD

Insulin and glucagon, both directions. Blood sugar too high, insulin brings it down. Too low, glucagon brings it up. Two opposing loops holding one number steady.

This is the same feedback diagram from week one, week two of content, and now week nine, and it is the third time it has come back. He told us in January it would.

> **Turned in:** feedback loop diagram → Lab Notebooks folder.

MON APR 5 **Glucose data CER analysis**

Real blood glucose graph data, and a CER claiming whether homeostasis is being maintained. The answer is not in any single reading, it is in whether the value returns to range and how fast.

My claim was right and my evidence was one data point, which is exactly the mistake this class keeps catching me in. A trend needs more than a moment.

> **Turned in:** CER → Claim Evidence Reasoning folder.

AT HOME, THE WEEKEND BEFORE TUE APR 6 **Submit endocrine evidence**

Gland diagram, feedback model, glucose CER, tracker updated with a confidence rating.

> **Turned in:** endocrine packet → recorded in Class Records.

> THAT WEEK AT HOME
>
> Forty five minutes. Glands and their hormones are flat memorization and went straight on cards.
>
> Weekend I redrew the insulin and glucagon loops until I could do both directions without looking, because I can feel that this is a guaranteed exam question.

## Week 12 · April 6 to 13

Unit: research model. Designing an experiment for real.

**WHY I KEEP GOING**

Ten weeks. I want to record that I nearly dropped this in February, when the Maniken build made me feel like everyone else had done this before and I had not.

What changed it was the rehabilitation week. I built a plan for a person who wanted to carry a grandchild again, and I understood that the plan was the care. Not a step before the care. Since then the hard weeks feel like the price of the thing I want.

### TUE APR 6 Animal research ethics debate ETHICS DAY

Using C. elegans, a roundworm about a millimetre long, in research. Does a simpler nervous system change the ethics, and where exactly is the line?

I said the line is capacity to suffer, and then had to admit I do not know where that sits for a worm and neither does anyone else with certainty. Writing a personal stance with one justification was harder than the usual CER because it is mine rather than a position I picked to argue.

> **Turned in:** exit ticket → Exit Tickets folder.

### WED APR 7 Variables and controls

Independent, dependent, controlled, labeled on a sample experiment. I have half known this since middle school and never had to be precise about it.

The controlled variables are the ones I keep underestimating. They are not the boring leftovers, they are the entire reason the result means anything.

> **Turned in:** labeled variables diagram → Lab Notebooks folder.

### FRI APR 9 Research design and poster plan TEAM DESIGN

Teams writing an actual research design: testable question, defined variables, target sample size.

We spent most of the period on the question, which felt like stalling and was not. Our first version could not have been answered by any experiment we could run. Narrowing it until it was actually testable was the work.

> **Turned in:** team research design plan → recorded in Class Records.

### MON APR 12 Literature and design analysis

Find a credible source, name one strength and one weakness of our design against it. Reading a real paper is hard. I understood maybe half and the half I understood was enough to see that our sample size was optimistic.

> **Turned in:** literature comparison summary → Lab Notebooks folder.

AT HOME, THE WEEKEND BEFORE TUE APR 13 **Submit design evidence**

Variables diagram, design plan, literature summary, tracker.

> **Turned in:** design packet → recorded in Class Records.

> THAT WEEK AT HOME
>
> About an hour, mostly the literature reading, which took three passes.
>
> Weekend was a full review pass over the first nine weeks. About a fifth of my own Cornell questions I could not answer, and that fifth is now the study list.

## Week 13 · April 13 to 19

Unit: the challenge. Our own investigation, start to finish.

TUE APR 13 **Heavy-metal exposure debate** ETHICS DAY

Who is responsible when a community is exposed to heavy metals? The company, the regulator, or the system that let both fail slowly enough that nobody had to decide.

This one is not abstract in Cleveland and everybody in the room knew it.

> **Turned in:** exit ticket → Exit Tickets folder.

AT HOME, THE NIGHT BEFORE THU APR 15 **Hypothesis and protocol**

If-then hypothesis, full materials list, step by step procedure. Written so somebody else could run it without asking us a single question, which is the actual test of a protocol.

We had to rewrite two steps because they assumed knowledge we had and a reader would not.

> **Turned in:** written protocol → recorded in Class Records.

THU APR 15 **Run the investigation** LAB

Our own design, our own protocol, multiple treatment concentrations. This is the first time all semester the experiment was ours rather than handed to us.

One concentration gave results that made no sense until we realized we had run it second to last and the samples had been sitting. Time was an uncontrolled variable and we did not see it coming.

> **Turned in:** completed data table → Data Tables folder.

FRI APR 16 **Data analysis and limitations**

Dose response claim, two specific data points as evidence, and a limitations section that had to name the timing problem honestly.

Writing down a flaw that weakens your own result feels like losing marks. He says it is the opposite, because the alternative is someone else finding it.

> **Turned in:** CER → Claim Evidence Reasoning folder.

AT HOME, THE WEEKEND BEFORE MON APR 19 **Submit investigation evidence**

Protocol, data table, dose response CER, tracker.

> **Turned in:** investigation packet → recorded in Class Records.

> THAT WEEK AT HOME
>
> Heavy week, close to an hour most nights. The protocol got rewritten at home twice.
>
> Weekend was lighter deliberately. I was tired and doing bad review is worse than doing none.

Unit: cardiovascular. The heart, and reading an EKG.

AFTER SCHOOL · CLEVELAND CLINIC

My Clinic onboarding cleared. Background check, modules, health requirements, all signed off. Eleven weeks from when I started, which is why he told us to begin in January.

In the spring I can be in an actual hospital, in an actual department, with an actual badge. I read the confirmation email twice. This is the first thing school has produced that exists outside of school.

MON APR 19 **Heart transplant allocation debate** ETHICS MONDAY

Rank the allocation criteria and defend the ranking in one sentence. Medical urgency, likelihood of success, time on the list, age.

Every ranking I tried produced a case I could not accept. Ranking urgency first means a heart can go to someone unlikely to survive the surgery. Ranking success first quietly disadvantages the sickest. There is no ordering that is not a value judgment.

> **Turned in:** exit ticket → Exit Tickets folder.

AT HOME, THE NIGHT BEFORE WED APR 21 **Heart structure and cycle**

Tracing the blood path from the right atrium all the way through and back. Four chambers, two circuits, valves that only open one way.

I had to trace it five times before it was automatic. The thing that finally made it stick is that the right side is a short trip to the lungs and the left side has to reach your foot, which is why the left ventricle wall is so much thicker.

> **Turned in:** annotated heart diagram → Lab Notebooks folder.

WED APR 21 **Heart model and EKG** LAB

Real EKG traces, labeling P, QRS and T, and linking each to what the heart is physically doing at that instant.

The QRS is enormous compared to the P wave because the ventricles are so much more muscle. You can read the anatomy off the electrical trace. That is the most satisfying thing I have learned all semester.

> **Turned in:** annotated EKG trace → Lab Reports folder.

THU APR 22 **Cardiac data CER analysis**

Comparing EKG and blood pressure data against normal reference ranges and arguing what it shows.

The limitation I wrote is that a single resting measurement says nothing about how this heart behaves under load, and load is where most problems show up.

> **Turned in:** CER → Claim Evidence Reasoning folder.

AT HOME, THE NIGHT BEFORE FRI APR 23 **Submit cardiac evidence**

Heart diagram, EKG, cardiac CER, tracker.

> **Turned in:** cardiac packet → recorded in Class Records.

THAT WEEK AT HOME

Forty five minutes. The blood path and the EKG waves are both guaranteed exam material and both are visual, so I drew them from memory rather than reading them.

Weekend I traced the circulation for you at the table with a pen. Sorry about the napkin.

## Week 14 · April 23 to 29

Unit: respiratory. Measuring our own lungs.

FRI APR 23 **Ventilator allocation ethics debate** ETHICS DAY

The same shape as the transplant question and somehow heavier, because a ventilator decision happens in hours rather than months.

Somebody asked whether you can ever take a ventilator from a patient already on it to give to someone more likely to survive. The room went silent. That is a genuinely different question from who gets the next one and I had not separated them before.

> **Turned in:** exit ticket → Exit Tickets folder.

AT HOME, THE NIGHT BEFORE TUE APR 27 **Alveoli and gas exchange**

Oxygen in, carbon dioxide out, both moving by diffusion down their own gradients across a membrane about half a micrometer thick, two flattened cells and their shared basement membrane.

No pump, no energy spent on the exchange itself. The whole system exists to maximize surface area and then get out of the way.

> **Turned in:** annotated gas exchange diagram → Lab Notebooks folder.

TUE APR 27 **Spirometry lab** LAB

Measuring our own lung volumes. Tidal volume across three trials, then vital capacity.

My first vital capacity was much lower than my second and third, because I did not fully exhale before inhaling. The technique is part of the measurement, and averaging three trials is what surfaces that a first trial was wrong.

> **Turned in:** spirometry data table → Data Tables folder.

WED APR 28 **Spirometry data CER analysis**

A claim about respiratory capacity using my own numbers, compared to predicted values for height and age.

Analyzing data that came out of my own lungs is different from analyzing a dataset. I wanted the number to be good, which is exactly the bias the reference range exists to check.

> **Turned in:** CER → Claim Evidence Reasoning folder.

AT HOME, THE NIGHT BEFORE THU APR 29 **Submit respiratory evidence**

Gas exchange diagram, spirometry table, capacity CER, tracker.

> **Turned in:** respiratory packet → recorded in Class Records.

THAT WEEK AT HOME

Forty minutes. Diffusion gradients are conceptual rather than memorization, so I explained the exchange out loud until it was clean.

Short week coming with the holiday, so I pulled some review forward.

## Week 15 · April 29 to May 3

Unit: immunity. Two days, then spring break.

### THU APR 29 Vaccine mandate ethics debate ETHICS DAY

Position on vaccine mandates citing one scientific reason, which forced the argument onto ground we could actually check. Herd immunity thresholds are a number, not an opinion.

The strongest counterpoint I heard was not anti-vaccine at all. It was that a mandate spends public trust, and trust is a finite resource you may need later for something else.

> **Turned in:** exit ticket → Exit Tickets folder.

### AT HOME, THE NIGHT BEFORE MON MAY 3 Innate and adaptive immunity

Innate is fast and general, adaptive is slow and specific and remembers. Then the lymphatic system, nodes and vessels labeled.

Memory is the part that makes vaccination possible at all. The second exposure is not the same event as the first because the body kept notes.

> **Turned in:** labeled lymphatic diagram → recorded in Class Records.

**Spring break.** The building is closed the whole week, so the immune modeling and the vaccine data CER moved to the following week. He told us not to do HBS work over the break, which is the first time all semester he has told us to stop.

> THAT WEEK AT HOME
>
> Two nights of twenty minutes, then nothing. I did reread the innate versus adaptive comparison on Sunday because the modeling lab was Monday.

Unit: adventure medicine, plus the immune work that moved.

> WEEKEND · THE RESEARCH EXPERIENCE
>
> I did the optional research extra credit on Saturday. A university lab hosted a few of us and a graduate researcher walked us through her actual project.
>
> Two things surprised me. Most of her week is troubleshooting and rerunning things that failed, which is exactly what happened to us in week eleven, so apparently that never stops. And she did not decide on research until her third year of college, which I needed to hear because I have been treating every decision as permanent.
>
> She let me pipette. I was bad at it. I want to do it again.

MON MAY 3 **Immune system modeling** LAB

The lab that moved. Comparing the primary and secondary immune response, with the timing and magnitude difference drawn out.

Seeing the two curves next to each other explains vaccination in one image. The second response is faster and much bigger, and that gap is the entire point.

> **Turned in:** comparison diagram → Lab Reports folder.

TUE MAY 4 **Vaccine data CER analysis**

Antibody graph, and a CER about how vaccination produces protection without the illness.

My reasoning sentence actually explained the mechanism this time instead of restating the claim. Seventeen weeks to get that right.

> **Turned in:** CER → Claim Evidence Reasoning folder.

WED MAY 5 **Extreme-environment risk debate** ETHICS DAY

Who is responsible for rescue when someone knowingly enters an extreme environment? Altitude, deep water, remote cold.

The version that got me is that the rescuers take on real risk for a situation somebody chose. That is not the same as ordinary medical need and I had never separated those either.

> **Turned in:** exit ticket → Exit Tickets folder.

AT HOME, THE NIGHT BEFORE FRI MAY 7 **Pathogen transmission**

Viral replication cycle with the points where an antiviral can intervene. You cannot design a drug without knowing which step you are trying to block.

> **Turned in:** annotated replication diagram → Lab Notebooks folder.

FRI MAY 7 **Plaque assay and eye dissection** LAB

Two labs in one block, and he was blunt that the plaque assay is a simulation. If these were real viral plates none of this would happen in a high school room, so the exercise is: if this were real, here is what we would have to do. The assay counts where virus has destroyed cells, so you are counting absence rather than presence, and the percent reduction per antiviral tells you which one worked.

The eye dissection was the hardest thing I have done in this class and the lens was worth it. It is genuinely a lens. You can hold it over text and the text gets bigger.

> **Turned in:** plaque count table → Lab Reports folder.

> THAT WEEK AT HOME
>
> Busy, around an hour. Two labs in one week plus the moved immune work.
>
> Weekend was almost entirely review. The unanswered pile is down from a fifth to under a tenth.

## Week 17 · May 11 to 14

Unit: patient perspectives. Everything comes back together.

### TUE MAY 11 Dialysis and transplant debate ETHICS DAY

The last Monday, and it is the allocation question one more time, now about kidneys. Third time this semester we have argued about who gets a scarce thing.

I noticed the structure this time before he pointed it out. Same shape, different organ. My position has moved across all three and I can finally say why: I started looking for the rule that produces no bad outcomes, and there is not one. What you choose is which bad outcome you are willing to own.

> **Turned in:** exit ticket → Exit Tickets folder.

### AT HOME, THE NIGHT BEFORE THU MAY 13 Nephron and filtration

The nephron in order: filtration, reabsorption, secretion, excretion. The kidney filters almost everything out and then deliberately takes most of it back.

That seems wildly inefficient until you understand it is how the body keeps precise control. It is easier to filter everything and reclaim what you want than to selectively remove what you do not.

> **Turned in:** ordered nephron diagram → Lab Notebooks folder.

### THU MAY 13 Renal and digestive labs LAB

Urinalysis dipsticks on simulated urine, and an enzyme digestion assay, in one block. Nobody's actual sample goes anywhere near this room. The dipstick is a row of little colour pads and each one is a separate test, which is a lot of information from one strip.

Protein in urine means the filter is letting through something it should be keeping. The test does not tell you why, it tells you where to look next.

> **Turned in:** combined data table → Data Tables folder.

### FRI MAY 14 Patient exhibit synthesis

The capstone. A patient narrative in one sentence, then three pieces of evidence from different systems across the whole semester that explain what is happening to them.

Mine pulled from cardiovascular, respiratory, and renal, and I had to reread my own work from October. The systems do not fail separately. That is the actual lesson of the whole course and it only lands when you are forced to connect three units you learned months apart.

> **Turned in:** patient exhibit outline → Lab Notebooks folder.

IN CLASS, FRI MAY 14 **Submit final evidence**

Nephron diagram, lab data, patient exhibit, final tracker.

Seventeen weeks, one body, one system at a time. In January I could not name the four tissue types. Today I built a patient case out of three organ systems and defended it with my own data.

> **Turned in:** final packet → recorded in Class Records.

> THAT WEEK AT HOME
>
> Two long nights on the exhibit, then done.
>
> The WebXam sits at the end of this course, so May is the finish and not a checkpoint. My plan for the weeks before it is fifteen minutes a few times a week on what is left of the unanswered pile.

Seventeen weeks, one body, one system at a time.

The first thing is that this class is not memorizing the body. It is proving things about the body with evidence you collected yourself. Every week ends the same way: a claim, evidence, reasoning, and an honest statement of what you cannot prove yet.

The second thing is that the Mondays are the reason the rest works. I thought the ethics day was a break from the real content. It is where I learned to hold a position, have it taken apart, and change my mind without feeling like I lost. Three times this semester we argued about who gets a scarce thing, and my answer moved every time.

The third thing is teamwork, which I was worst at. The muscle I placed backwards, the sensor we did not seat consistently, the sample that sat too long, the rehab plan I wanted to make too aggressive. Every one of those was caught by somebody else on my team, and most of them were communication failures rather than knowledge failures.

The fourth thing is that the class is not only the class. HOSA, chess, the Clinic badge, and the research morning were not extras. The Clinic clearance is the reason the cardiovascular week mattered to me. The research morning is why I now know that a failed run is the job and not a verdict on me.

What I need from you is what you are already doing. Ask me what the Monday question was and push back on my answer, because I get better at those when someone makes me defend them out loud. The fifteen minutes a night is not negotiable. And if I say I have no homework, ask me what is left in the unanswered pile.

I still want to be a nurse. In January that was a feeling about a room I sat in once. Now it is a set of things I have actually done: measured a person, built a plan around what they wanted, read a trace, admitted what my data could not show, and started again when it failed. That is the difference between wanting the job and starting to learn it.

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*Human Body Systems, Spring 2027. Sixteen systems, a lot of diagrams, one Maniken. Go Hornets.*