Questions:

- Briefly describe when I **first describe cell physiology.**
- Briefly describe how I present cell physiology in the **muscular system.**
- Briefly describe how I present cell physiology in the **nervous system.**
- Briefly describe how I present cell physiology in the **endocrine system.**
- Briefly describe how I present cell physiology in the **urinary system.**

Respondent #1:

- I introduce cell physiology the 2nd nd 3rd week. Then I keep teaching it throughout the course with specific system-specific examples.
- I teach muscle physiology during lecture and with lab exercises. I use animations on muscle contraction and the process of neural stimulation. I use HHMI videos as well as some animations that I created. I also use the Carolina Biological's rabbit psoas muscle fiber and ATP exercise to drive home the concept of energy requirement as well as the concept of rigor mortis. Histology of the three types of muscles are presented in the lab.
- I introduce the nervous system with physiology of the neurons. I only teach physiology of the NS during lecture and assign the anatomy of the nervous system via the Visible Body Courseware. We do not have cadavers dissection, and our models are limited. So, VB is a very good substitution for it. We do not do any wet lab activity on neurophysiology. I devote two weeks (two lectures, 5 hrs) on this topic. Histology is used to discuss the various types of neurons and glia and their location and function. Histology is used during lab to describe the conduction speed along axons.
- By the tiume we get to endocrine system, it is the end of the semester for A&P1. I do not go into too much detail about the physiology of the system during that time. I would already have introduced the relevant cellular biology over the semester leading up to this chapter. I describe the process of signal transduction, receptor-ligand binding, endocytosis of receptors in regulating responses, etc. referring back to the cell biology lectures. I mention and describe the differences between the forms of signaling (paracrine, autocrine, juxtracrine) and the future examples we would encounter in A&P2. I usually end up spending two lectures (5 hrs) on endocrine. Lab activities include histology of pancreas, adrenals, pituitary, thyroid with well defines endocrine regions.
- I spend quite a bit of time on urinary system explaining its role in over all homeostasis. I use a part of a cardiovascular physiology case study driving home the importance of the kidneys. Lab activities include urinalysis using either simulated or real (their own) urine as per their preference. If real urine is being used, they also do histology.

Respondent #2:

- 3 hours
- 6 hours
- 15-20 hours
- 15 hours
- 10 hours

Respondent #3:

- Two hour lecture at the very beginning of the course - focused on all aspects of membrane physiology to include channels, carriers, receptors. Lab demonstrates diffusion and osmosis using red blood cells.

- Two hour lecture focused on muscle fiber anatomy - sarcolemma, sarcomere, T-tubules, SR, DHP receptors Ca++ release channels, and myofilaments Physiology focuses on Action potential and excitation-contraction. coupling. Lab is EMG - motor unit recruitment. Lecture and lab cover all aspects of an action potential, to include changes in environmental conditions involving Na+, K+ and Ca++ concentrations.
- The lecture covers about 40 different hormones to include the gland/organ/tissue that produces them and the effects on target cells. Case study involves diabetes and blood glucose regulation. Lab involves a glucose tolerance test.
- Focus is at the nephron level and the tubule cells involved in reabsorption, secretion, and urine concentration, volume and content.

Respondent #4:

- I assign the chapter on cell structure and function as I get the semester started and test on Test 1.
- I spend at least a week on muscle lecture and at least two labs that focus on muscle physiology. Curare with live frogs and muscle (skeletal) with frog gastroc.
- As much as 1/4 of the course can be NS coverage. Lab is a sensory physiology lab. APs, synaptic transmission, TSs. May be one other lab that crosses over as curare does.
- A week of lecture and no lab coverage.
- At least a week in lecture and maybe on lab on urinalysis.

Respondent #5:

- Third week of course. One week allowed. Lecture is flipped - recorded lectures and in-class activities Lab - osmosis of RBCs, models of cells
- Lab - a model of the neuromuscular junction is all that is done in lab.
- Models of a neuron and microscopy of a neuron are done in lab.
- I don't teach a and p ii, so I don't cover this.
- I don't teach a and p ii, so I don't cover this.

Respondent #6:

- 3 weeks into a 16 week course that covers body organization through the nervous system; pre-class online lecture, in-class activities on active transport; passive transport membrane lab using erythrocyte hemolysis; time allotted might be 4.5 hours including lecture and lab
- lab: muscle histology, frog muscle lab demonstrating summation, group activities comparing muscle type excitation contraction coupling; time allotted 5.5 hours for lecture and lab
- lab: neural tissue histology only, no physiology in lab, 30 minutes lecture: 3 hours total for neural cell structure and function
- lab: beta cell physiology covered with glucose tolerance lab; 30 minutes lecture: control of hormone secretion, 1 hour
- lab: mechanisms of reabsorption and secretion covered with urinalysis and renal function lab; 1 hour lecture: mechanisms of reabsorption and secretion 1.5 hours

Respondent #7:

- 3 weeks into the semester 1 week PPT for lecture and Passive transport wet Lab
- electromyogram recordings are done for lab 2 weeks
- 3 weeks simulation labs online
- 1 week Glucose tolerance lab activity

- 2 weeks Simulation lab online

Respondent #8:

- one week into the course, two lectures and one lab on passive transport of molecules and osmosis into red blood cells causing hemolysis, lysis, or no change.
- three lectures, about skeletal muscle structure, also excitation-contraction coupling.
- PhysioEx lab or iWorx lab demonstrating action potentials in neurons and muscle cells compared to muscle tension. three or more lectures on neuron structure, action potentials, graded potentials, synapses. PhysioEx lab on same subjects.
- review cell communication, hormone structure, stimuli, receptors, target cell response, feedback loops
- process of filtration, reabsorption, secretion, excretion down to the cellular level within a nephron. Discussion of GFR etc. as well as calculations. Lab is only a urinalysis, so not much on cell physiology

Respondent #9:

- Cell physiology is part of the first unit. Three days are allocated with 1 lab activity.
- Cell physiology is covered mainly in lecture. Two days are allocated to cell physiology. I do an EMG lab activity.
- Cell physiology is covered only in lecture. Two days are allocated to neurophysiology, although it can spill into day 3.
- Cell physiology is covered in lecture but not in lab. Three days are allocated to endocrine physiology with endocrine anatomy covered in lab. We also do two endocrine case studies.
- Urinary physiology is covered mainly in lecture with three days allocated. The lab activity is a urinalysis lab. We also do a case study about renal physiology.

Respondent #10:

- Lab Enrollment - 600 students in 26 sections each fall and spring (plus ~200 in summer) for two-semester A&P Lab Lecture Enrollment - 400 students per section, x 2 sections of A&P Lecture each fall and spring (plus 200 in summer), one section/semester/faculty The above applies to all of the following courses! ---------- Lab: 4th week (first semester), Presentation + Hands-on activities on Membrane Transport, one 3-hr lab session (one week) Lecture: 3rd/4th week (first semester), Two 1.5-hr lectures (over 1-2 weeks)
- Lab: 5th/6th week (first semester), Presentation on muscles structure (histological slides) and function (physiology) + Cat dissection + Full scale models of superficial muscles + Hands-on recording of muscle twitch using PowerLab w/Transducer, two 3-hr lab session (over 2 weeks) Lecture: 5th/6th week (first semester), Lecture on gross anatomy (superficial muscles) + microscopic structure of three types of muscles + detailed physiology of muscle contraction, three to five 1.5-hr each lectures (over 3 to 4 weeks)
- Lab: 7th/9th week (first semester), Presentation on brain, spinal cord and autonomic nervous system - structure and function, Sheep brain dissection + Full scale models of brain, spinal cord and spinal nerves, histological slides, two 3-hr lab sessions (over 2 weeks) Lecture: 9th/10th week (first semester), Lecture on brain, spinal cord and autonomic nervous system - structure and function, three to five 1.5-hr each lectures (over 3 to 4 weeks)
- Lab: 12th/13th week (second semester), Presentation on endocrine glands - structure and function, histological slides and models, one 3-hr lab session (one week) Lecture: 8th/12th week (second semester), Lecture on classification etc., mechanisms of hormone actions

(receptors etc.), pituitary, thyroid, adrenal, pancreas, parathyroid, hypothalamus, GI tract, others endocrine tissues - structure, hormones and hormone actions, four to five 1.5-hr each lectures (over 3 to 4 weeks)

- Lab: 10th/12th week (second semester), Presentation on kidneys - structure and function, histological slides and models, qualitative urine analysis (Sp.gr, pH, abnormal constituents etc.) one 3-hr lab session (one week) Lecture: 13th/15th week (second semester), Lecture on kidneys - structure, physiology of urine formation, role in homeostasis, micturition etc., three to four 1.5-hr each lectures (over 2 to 3 weeks)

Respondent #11:

- 2nd week of course. We talk about roles of plasma membrane, structure and function of membrane junctions. This is via lecture. Most of this should be a review from the college level biology they are required to take as a prerequisite. We spend about 50 minutes of lecture on this.
- We go over the sliding filament mechanism of muscle contraction through videos, lecture, and class activities (problem based learning, and group demonstrations). Takes about 1 week. There are also short quizzes on this. We also review (briefly) aerobic and anaerobic respiration (since they should have had this already), This also takes about 1 week as discussed with other related topics like disuse atrophy. We start by learning about the action potential.
- Start with structure and function of neuron. A little electrophysiology, then action potential saltatory conduction- use videos, lecture, some class demonstration.. Takes about 1 week. No lab activities other than to look at neurons under microscope.
- We review transport processes across the cell membrane, focus on thyroid and pancreas at cellular level and how they produce and transport hormones. Involves lecture, lab and videos.
- We do cover glomerular filtration and how that works. We talk about the cells of the proximal and distal convoluted tubules and why reabsorption and secretion occur there. We do go through the countercurrent mechanism by using videos and lecture. We don't focus too much on cell type there. In lab, we study models and slides to reinforce these concepts.

Respondent #12:

- 1st week on. Most of our focus is what happens at the cellular level. We also then emphasize how this can be applied in a healthcare setting as all of our students are pre-allied health students.
- We teach this in physiology lecture. No muscle lab in physiology. We use to have a lab but found it confused our students more than help them.
- Again, this is all in physiology. We have two labs associated with this system one that we call the "sense lab" which reinforces what we teach them in lecture.
- This is all in lecture and we combine this with the nervous system so we can show how intertwined these two systems are.
- This is done primarily in lab. We do urine analysis and explain the cellular physiology of WHY they see certain items in their urine and why they don't see others.

Respondent #13:

- Usually in about week 3 for one 80 minute lecture period. No lab activity to consolidate is included. :(
- I use two lectures, 160 minutes. I use Pearson's IP2 videos as well as the study quizzes afterwards to have students complete them in their study groups.

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Respondent #14:

- Week 3 - half of the 3 hrs(1.5hrs) of lecture that week is cell phys. and around half of the 3hrs (1.5hrs) of lab.
- We walk through the steps of excitation and contraciton coupling. Students anotate visuals. We act out some of the steps (action potential) using our bodies to represent parts of the physiology.
- Around 1 hr of lecture and then most of the 3hrs of lab for that week involve neuron physiology and synapses. Students generally create a short presentation relating to a part of the neurophysiology that includes a student created visual.
- We work through flow charts of endocrine organ, hormone, target organ, response pathways and have a few case studies.
- We work through UA analysis (optional actiivity in the nearby bathroom) and minicases showing patterns of UA results that relate to health conditions. We discuss the physiology that leads to the altered UA results and sometimes discuss other findings that would be expected if checked.

Respondent #15:

- I do not have a separate cell physiology discussion but rely on their previous knowledge from the intro bio pre-req and review as necessary as learn how cells work in new systems
- Lecture time allotted is approximately 5 hour; I assign Pearson's PhysioEx for group work during lab; most of the lab is used for muscle identification on models and with our AR zSpace computers I have also created a critical thinking group activity with images to label as well as ordering a narrative of steps involved to produce muscle contraction
- About 10 hours of lecture for CNS, PNS, ANS, and Action potential; PhysioEx assignment as group work in lab; critical thinking group activity with images to label as well as ordering a narrative of steps involved to produce an action potential; we also do a lab involving reflexes and the reflex arc; sheep brain dissection
- About 3 hours in lecture; critical thinking group worksheet with table for organ created and affected, stimulus, response; also a worksheet regarding endocrine disorders including signs and symptoms
- About 4 hours in lecture; urinalysis, case studies, PhysioEx, kidney dissection; labeling images and viewing models

Respondent #16:

- We spend 1.5 weeks or 4.5 hours of theory time. With no pre-recs their cellular knowledge is limited. Additionally we complete two 2 hours labs on this topic.
- We spend 3 hours of cellular muscle physiology. Highly focus on skeletal muscle contraction. We do a class demonstration that involves participation of students as well as having them create an analogy.
- We spend 90 minutes on action potentials but completing a step by step chart together and then they complete an activity where beads represent ions to demonstrate.

- This system is not covered
- Utilizing diagrams of the nephron and discussing cellular properties. Completing a dialysis lab.

Respondent #17:

- 3rd week in the course, 1 week of lectures. No lab activity included
- lecture and activity in class. 1 week
- 2 lectures, 1 lab
- 1 lecture, 1 lab
- 1 lecture, 1 lab

Respondent #18:

- It is done in the pre-req course and briefly reviewed in week 1 of my courses.
- Physio-ex is used for the virtual muscle physiology lab - begun in lab and assigned as homework. Just acquired iWorx equipment to start with "real" labs in the fall.
- Physio-ex for virtual neurophysiology lab - begun in lab and assigned as homework. Just acquired iWorx equipment to start with "real" labs in the fall.
- Lab worksheets (20 minutes)
- Physio-ex urinary physiology and urine analysis lab, self-authored. 1 full lab period (2 hours 45 minutes)

Respondent #19:

- By second week
- 2 weeks
- 3 weeks
- Lab work only anatomy
- 2 weeks but no lab

Respondent #20:

- 1 lecture, 1 lab, naming the level of organization each time we see it.
- 1 lecture, 1 lab (simulation)
- 1 lecture, 1 lab (hands on data collection)
- 3 lectures, 1 lab (simulation)
- 3 lectures, 2 labs (pee lab hands on, other simulation)

Respondent #21:

- Approx 1 week of the term (out of 15) is dedicated to cell physiology, including osmosis
- Lecture material with some small group discussions and take home practice sheets.
- Lecture material with some small group discussions and take home practice sheets.
- Not as much detail of cell physiology in endocrine as for muscular or neuronal.
- Very little detail of cell physiology in urinary system.

Respondent #22:

- Week three of 15 week course
- Lecture describes physiology of muscle contraction; lab investigates physical effects
- Lecture describes neurophysiology; lab looks at function
- Lecture describes function; lab examines function and anatomy

- Lecture describes renal function; lab examines renal anatomy

Respondent #23:

- I first describe cell physiology in my course in week 2. I allot 3 lecture periods and include about 25% lecture, 50% group activities, 25% histology viewing
- I use a combination of lecture, group work, and class activities acting out the actions of sliding filament theory. I allot 1 lecture period
- I use a combination of lecture, group work, and a formative assignment. I allot 1 lecture period
- I use a combination of lecture, group work, and a formative assignment. I allot 0.5 lecture period
- I use a combination of lecture, group work, and a formative assignment. The concepts are tucked into the broader physiological picture of the nephron, so I am not sure

Respondent #24:

- I do not. I instead review cells and cell physiology. No lab activities are done.
- Cell physiology is covered at the start of the unit - 2 lecture classes and a lab activity.
- Same as muscular system.
- This system is not covered.
- This system is not covered.

Respondent #25:

- Week 2, two lectures, lecture #1 on membrane structure that includes an in-class exercise, lecture #2 on membrane function that includes an in-class exercise; lab 2 has exercises on diffusion, osmosis, and filtration
- We only do muscle physiology theory in lecture; lab is devoted to gross level muscle identification and muscle histology
- We only do neurophysiology theory in lecture; lab is devoted to gross and cellular anatomy
- We only do endocrine physiology theory in lecture; lab is devoted to gross and cellular anatomy
- We only do urinary physiology theory in lecture; lab is devoted to gross and cellular anatomy, although we do have a urinalysis component

Respondent #26:

- 2nd week 6 hours lecture, 2 hours lab activity
- Lecture only 3 hours
- lecture only 3 hours
- 3 hours lecture
- 3 hours lecture

Respondent #27:

- cell structure and function unit - weeks 3 and 4 of the first semester, 10 hours of class time, about half of which is spent on physiology like membrane transport and cell division/differentiation. The material is presented in lecture videos and reinforced in activities/labs (matching definitions and identifying examples of types of transport, lab involves diffusion and osmosis).
- muscles unit - weeks 11 and 12 of the first semester, 10 hours of class time, about 1/3 of which is spent on physiology like muscle fiber structure, membrane potential, coupling, sliding filament). The material is presented in lecture videos and reinforced in activities/labs (matching

structures to functions, interpreting stimulus-tension diagrams, labeling drawings, describing process, acting out the process as a class). Labs focus on anatomy rather than physiology.

- Nervous system unit - weeks 13-15 of the first semester, 15 hours of class time, about 1/3 of which is spent on physiology like action potentials and synaptic transmission. The material is presented in lecture videos and reinforced in activities/labs (labeling drawings, predicting the membrane potential change from various stimuli). Labs focus on anatomy rather than physiology.
- endocrine unit - week 6 of the first semester, 5 hours of class time, very little of which is spent on cell physiology.
- urinary unit - weeks 12 and 13 of the second semester, 10 hours of class time, about half of which is spent on physiology like filtration, reabsorption, and secretion. The material is presented in lecture videos and reinforced in activities/labs (matching definitions, predicting what will filter or be reabsorbed, labeling drawings). Lab focuses on anatomy rather than physiology, though we do urinalysis.

Respondent #28:

- Second week of A&P I; 3 hours lecture; two labs
- 3 hours lecture; two labs
- 3 hours lecture; one lab
- 3 hours lecture; one lab
- 4 hours lecture; one lab

Respondent #29:

- 4 weeks is when I go over membrane transport, 2 class periods of 50 minutes, 1 lab class period of 2 hours, taught by analogies and drawing on whiteboard, lab is tonicity (RBCs, Onion cells, Potato) and dialysis tubing.
- Front load material for terminology and general questions about muscle structure and function. Holistic to microscopic in view, explain anatomy and 3 dimensions of muscles, NMJ, animations. Lab activity, is activated rabbit skeletal muscle fibers for sarcomere appearance pre and post contraction, assessment of muscle fatigue, TENS units for demonstration of excitability and connection to cell communication, and reflexes for neurological assessment as well as processing time for grabbing a ruler that is being dropped. 3 class periods of 50 minutes. 1 lab class period of 2 hours.
- Front load material for terminology and general questions about nervous system structure and function. Central Nervous System and Peripheral Nervous System and Sensory Nervous System (this does not include neuron function--action potential.) Kahoot, history and ethics (eugenics, CTE, trepanation) of medicine for CNS. Lecture based primarily for CNS. Kahoot, Scare Jumps, Drug discussion and a group lab worksheet for ANS. Lecture, discussion, illusions, sensory adaptation examples. Lab: Two point discrimination for touch and drawing representation of receptive fields, thermoreceptors and paradoxical cold, Olfaction and determination of masked essential oils, sensory adaptation to smells, trigeminal nerve reflex, Identifying jelly bean flavors without olfaction, Genetics and PTC, Auditory Weber's and Rhinne's tests, Vision blind spot perceptual fill-in, visual acuity, pupillary reflex, superimposition, and Nystagmus. 4 classes of CNS 2 class periods of 50 minutes. PNS 2 class periods of 50 minutes and 1 lab class period of 2 hours.
- Front load material. Lecture, condensed material. Highlights of the endocrine system. 1 class period of 50 minutes.

- Front load material. Lecture, draw it to know it, group work on nephron. Lab urinalysis. 2 class periods of 50 minutes and 1 lab class period of 2 hours for both Urinary and Digestive system.

Respondent #30:

- Weeks 3-5, about 7 hours (mixed with cell anatomy), lecture, videos, lab on membrane transport and cell division, protein synthesis activity in which students are tRNA
- Lecture, videos, model of a sarcomere, students act as the parts of a sarcomere. About 2 hours.
- Lecture, videos. About 1 hour.
- Lecture, videos. About 1 hour.
- Lecture, videos, urinalysis lab, activity with beads that you taught us in Portland. About 3 hours.

Respondent #31:

- Third week into the course, and most of the entire week. We do a lab that week on cell permeability, examining tonicity, diffusion related to temperature and diffusion across membranes.
- No lab activities, but drawings, videos, group work and explanations are done in lecture. Students have a series of questions they answer coming into class, they work in groups to answer a more complex set of questions. We will then discuss as an entire class, finishing with a video of the process. We spend 1.5 lectures on this
- No lab activities, but drawings, videos, group work and explanations are done in lecture. Students have a series of questions they answer coming into class, they work in groups to answer a more complex set of questions. We will then discuss as an entire class, finishing with a video of the process. We spend 1.5 lectures on this.
- No lab activities, but drawings, videos, group work and explanations are done in lecture. Students have a series of questions they answer coming into class, they work in groups to answer a more complex set of questions. We will then discuss as an entire class and we will draw figures. We spend about 1 lecture on this.
- No lab activities, but drawings, videos, group work and explanations are done in lecture. Students have a series of questions they answer coming into class, they work in groups to answer a more complex set of questions. We will then discuss as an entire class. We will spend about 1 lecture on this.

Respondent #32:

- The second week of class in Cell chapter We usually use about three days to cover that chapter - 1 day for transport. In lab, we have an Osmosis Lab with a dialysis bag and sucrose solutions at different concentrations
- Muscle contraction - lecture and a worksheet In lab: EMG exercise using Biopacs 1 day; also use two other virtual labs using WileyPlus : a. Twitch Contraction and Summation b. Recruitment and Isotonic and Isometric Contraction
- Action Potential - Lecture and a worksheet Virtual lab in WileyPlus - Action Potentials
- Lecture on mechanism of action, receptors up/down-regulation Sometimes, use this exercise: LABORATORY EXERCISE USING ‘‘VIRTUAL RATS’’ TO TEACH ENDOCRINE PHYSIOLOGY Cynthia M. Odenw eller, Christopher T. Hsu, Eilynn Sipe, J. Paul Layshock, Sandhia Varyani, Rebecca L. Rosian, and Stephen E. DiCarlo
- Lecture and activity sheet Lab - urinalysis

Respondent #33:

- Typically cell physiology is in the 1st semester of a 2 semester course. We typically spend 1-2 weeks on this topic in lecture. Lab often involves tonicity type experiments and microscopy.
- The cell and tissue types are covered in lecture for the muscular system. In lab, we look at the microscopic differences between these tissues, but focus mainly on the different gross muscles. We do not do electrophysiology type work in this introductory course (predominately nurses).
- We cover action potentials, membrane potential and those types of details for neurons. We look at neurons under the microscope and do some reflex type activities in lab.
- Cell types and glandular tissues are covered for 1-2 weeks. We do a case study for this lab and we look at glandular tissues (thyroid, pancreas, and adrenal glands). Always wish there was a more interactive lab for this topic!
- 1 week typically on this topic. Lab activities include urinalysis (spiked with different things...protein, sugar, ketones, etc). Also look at the gross structures when dissecting either a fetal pig or cat.

Respondent #34:

- week 2 in lecture and week 3 in lab, 1 or 2 lectures and 1 lab, PowerPoint lecture presentation with videos and in lab they do diffusion and osmosis demonstrations with simple materials.
- We just do the structure of a skeletal muscle cell in lab using models and leave the function for lecture due to time constraints. Is one lab so about 2 hours.
- We just do the structure of a nerve cell in lab using models and microscope slides and the only nervous function we do is with reflex tests. Is one lab and takes about 2.5 hours.
- We just do the structure of endocrine organs with models and dissection in lab. As far as cell structure we just use microscope slides. We do a virtual lab on the thyroid but it covers very little cell physiology. Structure is part of one week in lab so 30 minutes and the virtual lab is another week and takes about 2.5 hours.
- We just do the structure of urinary organs with models and dissection in lab. As far as cell structure we do very little microscopic examination. We do a virtual lab on urine production which does discuss some cell physiology but not in great detail. Structure is part of one week in lab so about 2 hours and the virtual lab is another week and takes about 2.5 hours.

Respondent #35:

- Membrane transport is introduced in the week 2-3 lab for the course with an osmolarity experiment using red blood cells and raw eggs. Types of membrane transport along with cell structures are emphasized in lecture during weeks 3 and 4. Ion distributions and membrane potential is mentioned in the week 2-3 with the chemistry chapter.
- lecture activities - drawing of muscle contraction steps, videos on muscle contraction, wiki stick modeling of muscle contraction lab activity - measuring the contraction of psoas muscle under different conditions, muscle fatigue experiment
- lecture activities - drawing of neuronal parts and events during synaptic communication and action potentials lab activities - none
- lecture activities - review of cell signaling for protein and steroid hormones lab activity - drawing of glucose regulation, completion of glycemic index experiment
- lecture activities - drawing of nephron functions, lab activities - none that deal with cell physiology

Respondent #36:

- 3 weeks into the course (A&P1); 6 hours between lab and lecture; egg osmosis lab; PowerPoint presentation
- 8 weeks into the course (A&P1); 6 hours between lecture presentation/animation and lab muscle fiber experiment
- 10 weeks into the course (A&P1); lecture presentation/animation.
- 1 week into the course (A&P2); 1 hour in lecture
- 10 weeks into the course (A&P2); 3 hours for urinalysis in lab; 3 hours for lecture presentation/animation

Respondent #37:

- 3-4 weeks into the semester, we will spend about 6hrs in lecture and 6hrs in lab. Throughout the semester cellular physiology is discussed as needed., eg muscle, bone, nervous physiology.
- 3 weeks lecture, 2weeks lab. Poster presentations on sliding filament model & tissue, microscopy, muscle stimulation
- 3-4 weeks lecture with active learning activities, presentation, and a term paper. 3 labs nerve conduction velocity experiments, sensory receptors experiments, presentations,
- - 2 lecture with poster presentations, term paper on disorders, lab with tissue samples, glucose challenge
- 2-3 weeks lecture and lab, urinalysis & case study, poster presentations,

Respondent #38:

- cell membranes and membrane transport - Chapter 3 in the course so roughly week 3. Lecture presentation, Lab activities on diffusion/osmosis, simulations.
- Mostly lecture but some simulations. Biopac system. Lab on the muscular system is primarily focused on anatomy - naming muscles and their origin and insertion.
- We cover mostly anatomy, but some physiology using similations. Biopac system.
- We don't cover this much - brief overview but not much detail.
- We don't cover much physiology, more anatomy and naming structures and parts.

Respondent #39:

- Lecture portion of the course - weeks 2-3 of the first semester
- Lecture and lab portion of the course - weeks 9-10 of the first semester
- Lecture and lab portion of the course - weeks 4-6 of the first semester
- Lecture portion of the course - week 3 of the first semester (as part of the signaling/homeostasis pathway) Then again in the second semester in more detail for A&P at the start - repeated throughout the course
- Lecture and lab portion of the course - weeks 4-6 of the second semester

Respondent #40:

- Membrane transport is not covered in great detail. I ask students to go back and review the information if needed. Other aspects of cellular physiology (such as membrane potential) are covered in lecture for several lecture periods.
- The muscular system is presented via lecture and lab for a period of 1 week. The lab activity is an ATP muscle kit that is available from Wards. In this kit are skeletal muscle tissue to which students add ATP to cause contraction.
- The nervous system is presented via lecture and lab for a period of 1 week. The lab involves activities in which students test various aspects of neuron function.

- The endocrine system is presented via lecture and lab for a period of 1 week. The lab involves looking a lab models of the endocrine organs.
- The urinary system is presented via lecture and lab for a period of 2 weeks. The lab involves performing a urinalysis on artificial urine.

Respondent #41:

- Lectures 2-6 of 30. Prereading, pre-class quiz online (open book), in-class activities, group homework. One more lecture for cell signaling if you count that.
- this system not covered
- Relate resting membrane potential to electrical signaling and effect of hyper/hypokalemia.
- Prereading, pre-class quiz online (open book), in-class activities
- Cell signaling and membrane processes as general principles - majority of the class time Most of renal is related to membrane processes

Respondent #42:

- membrane transport is covered heavily in our prerequisite cell biology course - it usually has a week to a week and half devoted to it (and overall membrane physiology).
- I start with the muscle cell anatomy and then discuss the physiology of each part starting with the sarcomere and the sliding filament theory, but without the depth of ATP binding and cock back specifics, then I move back to the communication from the nerve and electrical to chemical to electrical signaling works there to create an action potential in the muscle, then I go back to the sarcomere and talk about the microanatomy and the role of calcium and ATP and work through the details of the contraction. My goal is to give them the outer pieces of this and work them inward in a way that they feel like they figure out the role of Calcium as the middle piece on their own - like a puzzle and when I finally get back to what happens with the action potential in the muscle and its effect on the sarcoplasmic reticulum they feel like they made that connection on their own (wait time is key). Then we go through it about 10 more times from start to finish drawing all the details out on the board with them.
- For structure and function of the nervous system, there is about a week of material on just nervous tissue, but then another on Spinal cord and peripheral nervous system and another week plus on brain and cranial nerves. I can usually get through autonomic in one day but special senses a week to a week and a half. Overall the nervous system is about half of my first semester A&P. We do brain and eyeball dissections for anatomy. We have a 30 degree vision shift experiment that demonstrates learning (adjusting/compensating) that the students like. We also use the HHMI mirror tracing star diagram exercise (learning a new skill)
- endocrine system gets about a week, I don't have any great experiments for this. I sometimes use a case study for this. Students do love to talk about this once they get excited about it.
- Urinary system is one of the toughest systems for students in my opinion. I have found that rearranging my course and teaching digestive system prior to urinary system helps students understand better.

Respondent #43:

- I cover it a bit in the introductory chapter in the context of the biological hierarchy, and a review case student on DNP and mitochondria. Probably 1-2 hours, mostly lecture.
- I have students draw a "typical cell" from what they remember, and then cover the structure of a muscle cell, and spend time reviewing concentration gradients to get into muscle cell physiology. But it's largely lecture and then students reviewing with drawing stuff. I'd like to say

2-3 hours. In particular I try to make the students do in class reviews of the cross bridge cycle and the NMJ. I used a NMJ case study as a take home assignment too (2 hours). We often do a muscle fatigue lab + lab report as a class. (3 hours)

- Again, I start with the anatomy, and typical structure of a neuron. Then, as we've covered gradients and membrane proteins with the muscular system, I try to start the review from there. But still lecture/drawings 4-5 hours. At one stage I used little paper circles to represent ions, and had students draw membranes.
- I compare cell signalling back to the nervous system. We cover the G protein receptor pathway at the end of the nervous system, so we come back to that. I have used a diabetes case study as well. Over the year in the class, I also have been having students present case studies from the textbook as well. 4-5 hours, lecture
- Starting with drawing/labeling a nephron. I like to review concentration gradients (from the nervous system) too. And then in lecture time have students recreate those structures/gradients/movements (like on the board). 5-6 hours-lecture

Respondent #44:

- 3 weeks in, lecture discussion lab osmosis activity with dialysis tubing
- lecture only
- lecture only
- lecture only
- lecture only

Respondent #45:

- BIO-201: introduced in week 2, over 2.5 hours of lecture and lab collecting/staining cheek cells
  BIO-202: introduced in week 2, over 2.5 hours of lecture and lab on blood histology/typing, with a quiz at the end of class
- this system is covered in BIO-201 beginning with 2.5 hours of lectures and group lab activity of the steps of muscle contraction, with a quiz at the end of class
- this system is covered in BIO-201 beginning with 2.5 hours of lectures and an individual lab activity of the steps of neuron communication, with a quiz at the end of class
- this system is covered in BIO-202 beginning with 2.5 hours of lectures and a group lab activity of the steps of hormone communication (target, action, effect), with a quiz at the end of class
- this system is covered in BIO-202 beginning with 2.5 hours of lectures and an individual lab activity of the steps of urine production through the nephron/hormone influences on production, with a quiz at the end of class

Respondent #46:

- membrane transport (max 2h)
- I use a commercial model of "sliding filaments", short videos, PPT slides, and matching activity assignments.
- videos, PPT slides, drawing activities. I wish we had a patch clamping system for this.
- PPT slides, videos, and group activities using diagrams and drawings to illustrate feedback loops. We use commercial models to show where the endocrine glands are located in the body and how they look like (more of anatomy). For example, transverse model of pancreas is a good one to show endocrine vs exocrine glands.

- We have detailed models of nephrons that we use. In one of HAS conferences, I learned about using inexpensive props and drawing to demonstrate exchange at different regions of the tubules.

Respondent #47:

- First week, we discuss the structure of the cell membrane, and membrane transport (diffusion, active transport, etc). Signal transduction is briefly introduced at this time
- Mechanism of contraction including membrane changes associated with Ach binding to the nicotinic receptor. I continue through activation of the DHP (t-tubules) and RyR (SR) and end with actin-myosin cross bridge formation formation. Tropomyosin, roles of troponin isoforms (C, T and I) are also discussed. Lad activities include computer simulation (Lt, AD Instruments) only (at this time)
- Mechanism of action of several different neurotransmitters involving signal transduction (IP3, cAMP, etc) are thoroughly discussed in lecture including the different receptors adrenergic (alphas, betas) and cholinergic (nicotinic and muscarinic). I also discuss the cellular effect of psychotropic drugs and their role on neurotransmitter and inactivation/reuptake). We ion movements and action potentials in lecture and lab. Currently, we are using the Lt labs (AD Instruments) to measure and analyze action potentials (depol, repol and hyperpol)
- Endocrine system is discussed at the end of the semester (along with Reproduction) and include mechanism of action of hormones on target cells including membrane (hydrophilic) vs intracellular receptors and transcriptional regulation by lipophilic hormones. We also discuss the effect of drugs including spironolactone). Feedback regulation is also discussed and we include effects of organ ablation and/or comprised (or enhanced) gland function on organ weights via laboratory assignments
- We discuss functional anatomy of the different cells in the nephron and the targets of hormones such as ADH and aldosterone. Membrane transport is thoroughly discussed here and includes regulation of glucose, sodium and water. I also examine pH regulation via the Type A and B cells. My background is animal physiology, so I use this opportunity to discuss salt and freshwater fish and osmoregulation

Respondent #48:

- We have lab activities and lectures in the first two weeks to introduce cell physiology. I spend about two lectures going over cell physiology in the first two weeks.
- There is one lab activity and two lectures that I present cell physiology of the muscular system
- There are two lab activities and three lectures that I present cell physiology of the nervous system
- There is one lab and one lecture activity on cellular physiology of the endocrine system
- There is one lab and two lecture activities on cellular physiology of the urinary system

Respondent #49:

- The second and third weeks are dedicated to cell physiology. Week 2 covers cell metabolism and week 3 covers membrane transport. Throughout the semester, we then specialize cell physiology for each organ system.
- Cell physiology is briefly covered in lecture. For labs, I have yet to find an activity I am 100% satisfied with. I have used PhysioEx simulated activities before but they tend to be confusing. I have also brought TENS units for them to experiment with. I have done salt on frog legs, but I hate to do this. :(-So, still searching.

- Cell physiology is briefly covered in lecture. For labs, I do like the PhysioEx action potential lab IF I do it with them concurrently during class time. I feel the same about this as I do muscle cells. I have yet to find an activity I am 100% satisfied with.
- Cell physiology is briefly covered in lecture. For labs, I have tried many different activities. Again, I have yet to find an activity I am 100% satisfied with.
- Cell physiology is briefly covered in lecture. For labs, I usually have them do urinalysis of several different simulated urine samples. They are also provided materials if they want to do urinalysis for themselves.

Respondent #50:

- The first week Students do a take home POGIL I made to review concepts and introduce gated channels and second messenger systems.
- I have big felt models and post COVID construction paper models that students color and cut apart. They then move the pieces through the steps of Excitation. I also typically use a rope and have students of different number hold the ends of the rope to demonstrate motor units and alternative activation of motor units so we discuss how a muscle organ maintains tension. We also do a arm dance to track the steps in contraction.
- I have cut out cells with ions and channels that we go through to look at RMP and AP. The. I use the HHsim and we alter variables to study these states and try to predict outcomes.
- We do a phase case study that tracks a patient and students have to look at the signal and receptors of hormone feedback loops to explain normal phys and then the pathology.
- I use a modified version of your activity where students are given a sample of beads to represent elements of urine and students work through the nephron to modify filtrate into urine. I have a POGIL take home they use to review and then apply basic physiology.

Respondent #51:

- Cell physiology is integrated with molecular/biochemical mechanisms and organ system integration throughout the course. We start at the first week. There are both lecture and lab components, as well as group work, various problem-solving exercises. This class is taught both in person and online.
- I give about three lectures on the muscular system. There are 1-2 lab exercises. There is one group problem solving activity. There are a variety of exercises and quizzes. For the online course, the student design and conduct their own experiments using Arduino-EMG systems.
- I give about four lectures. There is one lab, one group problem-solving activity, and various exercises and quizzes.
- I give about three lectures on this topic (includes stress and immune systems). There is one lab, one group problem-solving activity, and various exercises and quizzes.
- I give two-three lectures on this topic. There is one lab, one group problem-solving activity, and various exercises and quizzes.

Respondent #52:

- The topic is integrated with all other topics and introduced for two weeks
- The topic is integrated with all other topics and introduced for two weeks
- The topic is integrated with all other topics and introduced for two weeks
- The topic is integrated with all other topics and introduced for two weeks
- The topic is integrated with all other topics and introduced for two weeks

Respondent #53:

- 2 hours, simulation activity for membrane transport
- 2 hours, muscle structure and contraction
- 2 hours, synapses, how signaling changes with drugs
- 2 hours, blood glucose, how various feedback loops work
- 2 hours, Urine analysis and a rat dissection (on paper)

Respondent #54:

- Cell physiology is in nearly every lecture, i.e. protein structure/function and exchange. Histology, integument alterations, skeletal formation/hormones, muscle sarcomeres, neurotransmitters and potentials, blood/gas transport/transformation, cardio excitement, immune, endocrine, urinary filtrate, gamete production, fertilization. It's all cell phys. End motor plate and sliding filament theory.
- Muscle stimulation and sarcomere functions (calcium induced calcium release), we spend 2 hours covering just those ideas, including all proteins and ions involved. Assignments: homework activities labeling and describing the parts of the system, essay exam on full details. Lab is focused on anatomy and only a little example of sarcomere action through models.
- Action potentials with membrane transport of ions with mV changes. Neurotransmitters release/receive function and cell alterations. Time: 2-3 hours total Assessments: homework activities labeling and describing. Essay exam focusing on those topics. Lab: doesn't cover neuro cell phys, just anatomy
- Everything. Creation, release, transport, receptor type, signal type, up/down regulation, etc... all cell phys Time: 3 hours Assessment: homework labeling and discussion, essay exam focusing on every part of the endocrine cell phys. Lab: doesn't cover endocrine cell phys, just anatomy
- Nephron filtration and reabsorption. Renin/Angiotensin/Aldosterone pathway. Time: 2 hours Assessment: homework labeling and discussion, essay exam focusing on every part of the urinary system Lab: fluid balance (but on a gross scale).

Respondent #55:

- Jobs of each organelle and coordination of workload. Use of energy. Communication between cells. Week 2. 9 weeks.
- Molecular biology of muscle contraction and energy management strategies. Lab is learning muscles and muscle actions. 1 week.
- Electrical circuit theory, cellular electrophysiology, origin of membrane potential, mechanism of action potential propagation, mechanism of synaptic transmission, roles of brain divisions. 3 weeks.
- Covered in second semester (A&P II). Mechanisms and necessity of coordinated responses of all cells to environmental situations. Ligand/receptor interactions. How hormones set the stage for system responses. 2 weeks.
- Regulation of homeostasis by kidney via hormones feedback systems. Autoregulation and disease states. 2 weeks.

Respondent #56:

- First week. ~40 minutes that first week. Lecture presentation (receptors, chemical messengers)
- Lecture. ~180 minutes. handouts. In class discussion. No lab activity
- lecture. videos. worksheets. ~160 minutes. No lab activities

- Lecture. ~200 minutes. No lab activities.
- Lecture. ~ 150 minutes. take home assignment. no lab activities.

Respondent #57:

- Typically spend 1 week on cell physiology and 1 week specifically on metabolism but principles and concepts covered throughout.
- Lecture wise: discuss everything from fascicle patterning to continuum of the spectrum of fiber types and motor units, stages of excitation-contraction coupling and sliding filament Lab wise conduct experimentation on EMG analysis of recruitment, of fatigue (isometric and isoinertial), examination of fiber contraction following exposure to Na and ATP solutions
- Lecture wise: cover membrane potentials, ion movements, axonal transport and modifications based on use/disuse or damage Lab wise: Tend to be non-cellular, but conduct simulations of membrane potentiation and action potential transmission
- Lecture wise: discuss principles of receptor regulation and intracellular cascade in general with specific list of effects of hormones Lab Wise: not covered
- Lecture wise: discuss transmission mechanisms and osmotic gradation allowing for filtration and clearance of substances. Review of biochemical reactions Lab Wise: non-cellular

Respondent #58:

- 2-3 weeks into the course - lecture with visual aids, white board drawings, video 1-1/2 lecture periods
- lecture with visual aids, white board drawings, video 2 lecture periods
- lecture with visual aids, white board drawings, video 2 lecture periods
- this system not covered
- this system not covered

Respondent #59:

- week 1, 2.5 hours lecture
- 2 hours lecture, plus 1 hour lab
- 4 hours lecture and 1 hour in lab
- 1 hour lecture, 1 hour lab
- 1 hour, 2 hours lab

Respondent #60:

- Membrane transport is first described at the end of week 2 and into week 3. We spend about 1 week (2 lecture class periods) on membrane transport. In the 3 hour lab, we have students do activities on diffusion and osmosis and also do several case studies involving osmosis and tonicity. For the osmosis lab, students were directed on how to make different salt water concentrations and placed baby carrots into them and observed the carrots for change in size (this was an online lab they could do at home due to COVID).
- In the lecture class, I draw out the crossbridge cycle and also act it out. I have the students act out the crossbridge cycle with me, so that they'll remember it better. I spend about 45 minutes on this. In the 3 hour online lab, we had students do an activity on muscle fatigue (number of times can open/close a clothespin in 2 minutes). We also had them repeat this activity after putting their hand in ice. We also did activities on isotonic vs. isometric muscle contractions and recruitment. In the face-to-face lab, we use iWorx machines to stimulate and record muscle twitches.

- In the lecture class, I draw out a neuron and put the different types of ion channels where they are located on the neuron and also what they produce in the neuron. I also draw out an action potential, showing the position of the gates of the voltage-gated sodium and potassium channels during the phases of the action potential and the direction the ions are moving (into or out of the neuron). I have students draw this out in small groups as well. We spend an hour on this. In the 3 hour online lab, we have them do activities that involve the sensory nervous system, so the lab doesn't really cover this.
- In the lecture class, I spend some time going over hydrophilic vs. hydrophobic hormones and how that affects how they are released from the secretory cell, where their receptors are found on the target cell, etc. We draw lots of pictures of these in class. I also quiz students by putting up a picture of an unknown hormone and having them tell me whether it's hydrophilic or hydrophobic based on what's going on in the picture. We spend about 1.5 weeks on the endocrine system because I really like it! In the 3 hour online (and also the face-to-face) lab, we use an endocrine lab we found on the HAPS website: Odenweller et. al., LABORATORY EXERCISE USING ‘‘VIRTUAL RATS’’ TO TEACH ENDOCRINE PHYSIOLOGY, AM. J. PHYSIOL. 273 (ADV. PHYSIOL. EDUC. 18): S24-S40, 1997. The students love this lab!
- In the lecture class, I draw out a nephron, showing the differences in substances transported in the different locations of the nephron (this takes about 2 hours). I give students a basic outline of the picture to which they can add to as I draw it out. I also give them extra copies, so that they can practice redrawing it at home. In the 3 hour online lab, 3 students remotely (or 3 people in the same household) either drink 500 ml water, 500 ml soda, or nothing. Students collect their urine sample every 30 minutes and do a urinalysis with a urinalysis strip. Students also read two case studies on the urinary system and calculate the creatinine clearance for both patients and decide what it indicates about the GFR.

Respondent #61:

- In Gen Bio 1, cell physiology is first introduced in week 4. We spend the rest of the course learning about cell structure, functions, and processes.
- Briefly mentioned as part of muskoskeletal system in Bio 2.
- Briefly mentioned as part of nervous and sensory sytems in Bio 2.
- Briefly mentioned as part of endocrine system in Bio 2.
- Briefly mentioned as part of digestive system in Bio 2.

Respondent #62:

- I don't allot any lecture time to cell physiology as this is typically covered in Gen Bio I which is a prerequisite to the course. I do have the students do a review of the material in the form of a take-home test which requires them to refresh their memory on the aspects of cell biology relevant to A&P.
- The physiology of the muscular system is covered over approximately three class periods using power point lecture, diagraming on the board, and handout activities done in groups. I also devote four labs to learning both human muscles and their actions and either cat or mink muscles through dissection activities.
- The chapters covering the nervous system take almost half of the course lectures and I/4 of the labs. I do sheep brain and cow eye dissections as well as extensive use of models of the eye and ear.
- The endocrine system takes 2-3 lecture periods and includes case studies done in small groups. The endocrine lab content is minimal. Just identifying the major endocrine glands.

- The urinary system lecture is covered in two lectures with board diagrams and case studies. In one lab we cover the anatomy and do a urinalysis with either real or synthetic urine.

Respondent #63:

- Because a prerequisite is required, we start A&P I with histology and in the histology unit mention cellular aspects of the different tissues. For example how nervous tissue and muscle tissue are similar in that both exhibit excitability.
- We use glycerinated muscle preparation to demonstrate muscle physiology in the A&P I lab. This takes one full 3 hour lab period. https://www.carolina.com/physiology-kits/glycerinated-muscle/203520.pr?question=Muscle. The lecture uses images of the process of skeletal muscle contraction. There are also several videos used in lecture that demonstrate the process of skeletal muscle contraction.
- This is demonstrated using PhysioEX simulation software. A full 3 hour lab period is devoted.
- This is demonstrated using PhysioEX simulation software. A full 3 hour lab period is devoted.
- This is demonstrated using PhysioEX simulation software. A full 3 hour lab period is devoted.

Respondent #64:

- the lecture portion of the course is taught by a different faculty member, I only teach the lab portion, and this topic is not covered in a laboratory setting
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- pre-covid students did basic urinalysis on their own samples, before and after drinking 500ml of water. during covid I have assigned online simulations of kidney physiology using Pearson's Mastering A&P website

Respondent #65:

- 2nd week of class - 15 mins lecture & then 15 mins for small activity. 10 mins laboratory & then applied small activity in lab 15 mins.
- 1 hour in total in lecture (spent over 2 lectures) on more in-depth content (students watch my pre-made videos in advance that addresses basic content) & then 30 minutes on group activity in class.
- 1.5 hours in total in lecture (spent over 2 lectures) on more in-depth content (students watch my pre-made videos in advance that addresses basic content) & then 30 minutes on group activity in class.
- 1.5 hours in total in lecture (spent over 2 lectures) on more in-depth content (students watch my pre-made videos in advance that addresses basic content) & then 30 minutes on group activity in class.
- 1.5 hours in total in lecture (spent over 2 lectures) on more in-depth content (students watch my pre-made videos in advance that addresses basic content) & then 30 minutes on group activity in class.

Respondent #66:

- By third week: membranes as ion diffusion barriers, concentration differences across membranes.
- Lecture exploration - sarcomere structure, then calcium control as an extension of earlier signal transduction systems.
- Action potentials are a review by the time we reach the nervous system. Introduced early in course, then reinforced in muscular section.
- Brief exploration of the pituitary gland with the nervous system - treated as a further example of chemical signaling from earlier in the course.
- As a sequence of active and passive transport processes growing out of the first semester membrane transport topics.

Respondent #67:

- Unit 2 when Nervous system, neural tissue and electrophysiology are introduced. About 3-4 weeks in the course to get from membrane potentials, to a synapse, to the NMJ to sliding filament theory. Students spend time on active learning activities studying gradients, membrane channels, and sub cellular protein-protein interactions. There is no wet lab activity, but numerus dry activities with LT tutorials and white board activities.
- I teach muscle phys on the heels of electrophys. We only spend about 2 weeks here in lecture, but much reinforces what was just covered. The focus would be EEC and CBC. In lab there is a knee-jerk reflex and EMG antagonistic pairs lab, that align with big picture ideas, but specific cellular mechanisms are not the focus and not assessed heavily lab. They are referenced, but students are assessed more on "doing science" and communicating results in a written format.
- Unit 2 when Nervous system, neural tissue and electrophysiology are introduced. About 3 weeks in the course to get from membrane potentials, to a synapse. Students spend time on active learning activities studying gradients, membrane channels. There is no wet lab activity, but numerus dry activities with LT tutorials and white board activities.
- Lecture only, this is the start to A&P 2. About 3-4 weeks total, 2 weeks is true endocrine and 2 more is really repro, but we do gametogenesis, and menstrual cycle paying attention to cell types and products. There is no wet lab activity, but numerus dry activities with LT tutorials and white board activities.
- Final unit of the A&P about a 1.5-2 weeks to cover renal phys, fluid/acid/base balance. There are a few dry activities with LT tutorials and white board activities. There is a uranalysis lab that requires students to apply knowledge of the filtration barrier to discuss results. They also have a pretty cool final integrative assignment on long and short term BP regulation which also pulls in some renal concepts.

Respondent #68:

- About three weeks into the semester, covered after after A&P overview, inorganic and organic chem, and basic cell structures and functions. Multiple lectures on membrane transport, gene regulation, and cell signalling.
- In lecture we do an adaptated "Buffalo" case study on malignant hyperthermia to explore the role of calcium and cell signalling that controls muscle contraction and relaxation. There's a Gray's Anatomy clip that goes with it. In lab, the students do EMG on BIOPAC, but this is a later semester due to our course sequence. At a prior institution I used glycerinated muscle tissue, and when ATP is added a contraction may be observed.
- In lecture I do an adapted "Buffalo" case on aliens using different ion channel toxins. In lab they do mostly neuroanatomy, not neurophysiology, but Jennifer Mansfield-Jones my colleague

would no better. I do not think the students do EEG on BIOPAC, but I did this at another institution where I directed lab. I also did sciatic nerve compbound action potentials there (first with live material and later with PhysioEx simulation).

- In lecture, I cover the over view of cell signalling (ex. ligand/receptor, cAMP or Ca++ second messenger). I cover hormones in every system later (e.g. PTH, Calcitonion, Erythropoietin, ADH, Aldosterone, ANP, GnRH, LH, FSH, T, E2, Prog, etc.). We always cover it as 1) stimulus/trigger 2) source of hormone 3) type of hormone (hydrophylic or hydrophobic) determines mode of action 4) targets (with hormone receptors) 5) specific effect on cellular and tissue activity 6) feedback as neg or pos. They need this paradigm applied over and over to see the similarities and predict how the body makes homeostatic adjustments. We do not have a lab activity other than patient connection articles perhaps.
- In lecture I use case studies related to blood pressure regulation. Mostly urinary system anatomy and patient connection articles are used in lab.

Respondent #69:

- Membrane transport discussion begins in week 3 of the course. We spend 3 weeks on cell physiology in our A&P I lecture course. We generally have students complete a mastery reading assignment prior to lecture or lecture activities. Students complete two out of class assignments on cell physiology, and I usually have students work on a worksheet in class together. In lab, students observe a diffusion experiment and make predictions based on their understanding of osmosis and diffusion. This occurs in week 3 of the lab and is an activity that takes approximately 1 hour total.
- Cell physiology in the muscular system is exclusively in our lecture part of the course currently. We spend approximately 1.5 weeks on muscle physiology. I have students complete a mastery reading assignment prior to lecture activities. I have students watch animated videos, work together to put events in order, and they do worksheets together. I also have students take a group quiz on these topics. Students also complete an out-of-class review assignment on this topic.
- Cell physiology in the nervous system is covered in lecture only. We discuss neurophysiology for approximately two weeks in lecture. Students complete a mastery reading assignment prior to lecture activities. Students draw along with me as we draw neurons, where ion channels are located, and the action potential graph. Students work together on handouts and do take a group quiz. Students also complete an out-of-class review assignment.
- Endocrine physiology is only presented in lecture. I spend one week on this topic. Students complete two mastery reading assignments before this topic. I first discuss the differences between the two main chemical classes of hormones and then discuss specific hormones and how they function as examples. Students work together on a handout and complete an out-of-class assignment. They also complete a group quiz in class as well as an online quiz on this topic (because it is at the end of the semester).
- Urinary physiology is covered in lecture only. Students prepare beforehand by completing a mastery reading assignment on the topic. I spend 1.5 weeks on this topic. We watch videos, draw the nephron and fill in where specific transport is occurring as well as functions of the nephron, and we answer critical thinking questions in the classroom as a group. Students complete an online review assignment and work together to take a group quiz.

Respondent #70:

- Cell physiology is introduced in week 5 of the first semester of introductory biology with a combination of short lecture and a case study from the National Center for Case Study Teaching in Science (NCCSTS) entitled, "Take two in the morning." Initial topics of cell physiology are covered over four lecture periods.
- Cell physiology in the muscular system is covered in the subsequent 300-level human physiology course.
- Cell physiology of the nervous system is introduced in week 10 of the second semester of introductory biology and further examined in human physiology. Cell physiology of the nervous system is only covered in the introductory biology lecture, but not in the lab. One of the first activities I use is: https://qubeshub.org/publications/1405/2
- Cell physiology in the endocrine system is covered in the subsequent 300-level human physiology course. This course is lecture only, so no lab activities are used. Instead, a combination of lecture with polling questions, POGIL activities, and worksheets are used to examine this topic.
- Cell physiology in the urinary system is covered in the subsequent 300-level human physiology course. This course is lecture only, so no lab activities are used. Instead, a combination of lecture with polling questions, POGIL activities, and worksheets are used to examine this topic.

Respondent #71:

- About 3 lectures 4.5 hours - About the second and third weeks of the course, for the introduction. We do a dance in lecture to show the steps of mitosis, and also do dance for showing how exocytosis and endocytosis happen. *This was a challenge in a remote class during COVID-19 restrictions.
- We do a live interpretation of the sliding filament theory, with some students as thick filaments and others as thin filaments. Students wear either red or blue shirts to represent thick or thin filaments.
- We mainly concentrate on histology of the nervous system. Our activity is describing through dance, the interactions of motor neurons, interneurons, and sensory neurons through dance.
- We don't have a good activity for endocrine. We spend one week on endocrine system.
- We cover the urinary system, but also do not have a good activity for urinary system.

Respondent #72:

- 1 week into course, 1-2 week to discuss across 2-4 lectures (1.5 hours each). Cellular physiology is introduced early as a foundational principle of physiology including concepts such as membrane transport, cellular signaling, etc.
- introduce structures within the myofiber and discuss how the structures work together to produce a powerstroke. Usually 1 lecture.
- Primarily discuss different kinds of receptors and receptor potentials, how action potentials are created, the mechanisms of neurotransmitter release and synaptic action. Usually 1 to 1.5 lectures
- Discuss signaling cascades, primarily cAMP/PKA pathway and nuclear receptors but introduce other pathways that don't use GPCRs. When discussing endocrine, focus is placed on the terminal hormone and less so on the hypothalamic and ant pituitary hormones (other than feedback loops). I generally ignore hormone production, especially TH production which I think is a relic of old textbooks and not particularly useful or helpful to understanding hormone action. Signaling cascades and nuclear receptor mechanisms are generally discussed independently in first unit when discussing foundation principles of cell signaling. When

discussing specific hormones, it's more fore focused on the broader function of the hormone, less on mechanism of action. So about 1-2 lectures on cell signaling during first unit.
- Discuss RAAS and regulation of water/salt balance mostly. Discussion of filtration/absorption/secretion mechanisms. Ignore acid/base balance mostly due to time constraints. about a full lecture of material across two classes to teach.

Respondent #73:

- I first describe cellular physiology about seven weeks into the semester with muscle contraction. Students review cell physiology such as membrane function, transport, cellular respiration, and DNA replication in some online review assignments in the first week of the semester. The cellular physiology being reviewed is what they should have learned in the prerequisite cell biology class. I start of my class by describing the structures and their functions. The cell physiology comes in later as I describe how these pieces work.
- I typically devote 3-4 75-minute sessions to the muscular system. The first day I cover the terminology and anatomy. The second day I start covering the process of how muscle contraction works (the cell physiology). I use a combination of board work, video, and powerpoint presentation. I generally start with board work where I draw out the process of muscle contraction.
- I start with the neuromuscular junction and the events that occur there. I draw out and label the different pieces and review them multiple times with the class. I review the powerpoint presentation version and then show a video of this process. Then I move on to excitation-contraction coupling and do the same. I finish up with the crossbridge cycle using the same method. Then I put it all together and then discuss relaxation.
- I do a combination of board drawings and powerpoint lecture slides. For example, with the action potential I walk through this process step by step drawing it out on the board. Then I show the steps and drawings from the book on the lecture slides.
- This topic is covered in the second semester course. I have not taught this course for a couple of years. This topic is covered in the second semester course. I have not taught this course for a couple of years.

Respondent #74:

- Usually within the second week of the course (unless holiday pushes it to the third week). Actual class time varies but 1 or 1/12 50 min.
- lecture session; one lab on osmosis & diffusion.
- histology in A&P only; two demonstration labs with iworx in Physiology histology only in A&P; reaction time lab, reflex lab in Physiology
- Cell physiology of endocrine system not covered in the lab in either course.
- histology only in A&P; urinalysis lab in Physiology

Respondent #75:

- Week 2 of 15, part of week 2 only of AP1
- Covered in Week 6 of 15 in AP1, lecture only, no lab activities
- Weeks 7 and 8 in lecture in AP1 Week 1 of AP2, lecture only
- Week 9 (Urinary system) and Week 10 (Fluid, Electrolyte and Acid-Base Balance) of AP2, lecture only

Respondent #76:

- Second week (during the first week I give an overview of A&P and review chemical principals).
- Currently I rely on online simulations (e.g. PhysioEx, Virtual labs). I hope to implement ADI Instrumentation and a hands on activity this coming spring.
- Currently I rely on online simulations (e.g. PhysioEx, Virtual labs). I hope to implement ADI Instrumentation and a hands on activity this coming spring.
- I do not cover the physiology of the endocrine system during lab.
- I have the students collect an analyze their own urine samples with dip sticks. They then centrifuge their urine and examine the sediment under a microscope.

Respondent #77:

- 3 weeks, 75 minute lecture, 75 minute lab, power point, short video, diffusion & semipermeable membrane lab activities
- Power point, short videos, muscle fatigue & recruitment as a computer lab activity, 2-75 minute lectures, 2-3 75 minute labs
- Power point, short videos, computer lab activity, 3-75 minute lectures, 2-3 75 minute labs
- Power point, models, 75 minute lectures, 75 minute lab
- Power point, models, 2-75 minute lectures, 75 minute labs

Respondent #78:

- Cell physiology takes up roughly the first 2.5 to 3 weeks of the course, mostly via lecture, group work/ discussion, and videos/ external teaching aids. Lab sessions focus on structure.
- Muscular cell physiology is taught for one week of lecture, including group work and external teaching aids. Lab sessions focus on structure.
- Nervous system cell physiology is taught for one week of lecture, including group work and external teaching aids. Lab sessions focus on structure.
- Endocrine cell physiology takes up roughly one lecture. Lab sessions focus on structure.
- Urinary system cell physiology takes up roughly one week of lecture with videos and group work. Lab sessions focus on structure.

Respondent #79:

- lecture presentation - within the first 2 weeks of the course
- lecture presentation within the first 8 weeks of the course
- lecture presentation within the first 8 weeks of the course
- lecture presentations during the first 8 weeks of the third semester in a 3 semester sequence physiology/pathophysiology course taught to graduate students
- lecture presentations during the last 8 weeks of the third semester in a 3-semester sequence physiology/pathophysiology course taught to graduate students

Respondent #80:

- Second week! Two lecture sessions (60 min each)
- Week 8 - three full weeks of class, sliding filament and NMJ junction in lecture. Rabbit psoas and ATP under scope in lab.
- Week 12 - three to four full weeks of class, Action potential lecture and group activity
- Week 1 - lecture
- Urinalysis, week 13. Lab and lecture

Respondent #81:

- first day - homeostasis/feedback - lecture PPT w/ embedded questions; approximately an hour
- all lab is anatomy cell physiology is all lecture
- most lab is anatomy; I sometimes do an activity on a white board w/ magnets to practice action potentials cell physiology is all lecture
- all lab is anatomy cell physiology is all lecture
- all lab is anatomy cell physiology is all lecture

Respondent #82:

- Done within the first month. Usually allocated approximately 4 hours, 2 lecture and 2 lab. Lab involves hands on experimentation with blood and various solutions to illustrate osmolality and tonicity
- 2 hours lecture and 2 hours small group PBL
- 11 hours lecture and 8 hours small group PBL
- 14 hours lecture and 8 hours small group PBL
- 9 hours lecture and 6 hours small group PBL

Respondent #83:

- Membrane transport is taught during the second week of class. By lectures - 2 lectures at 80 min each. Students also have an online homework assignment to complete for credit (Mastering A&P).
- Muscle cell physiology is covered during the 3rd and 4th week of classes - about 2.5 lectures at 80 min each. Again, students also have an online homework assignment to complete for credit (Mastering A&). We spend most of the time on skeletal muscle, but also look at smooth muscle cells. Animations from Mastering A&P and other sources are also used to help ensure understanding.
- This is covered during the second and third weeks of classes - about 2.5 lectures at 80 min each. Students also have an online assignment to complete for credit (Mastering A&P) and I also use some Mastering A&P animations and videos in class.
- The endocrine system is covered in part during Week 6 when we cover homeostasis (about one 80-min lecture) and revisited in the next term when we cover the endocrine regulation of metabolism and again when covering the reproductive system. Again, supported by online homework assignments via Mastering A&P and supportive videos and animations where possible.
- This topic is covered during the second semester and supportive videos and animations are used. Perhaps 1.5 lectures for a total of 120 minutes. Homework online assignments via Mastering A&P.

Respondent #84:

- Week 3: Membrane Transport. Probably 2 hours total. Lecture includes diffusion, filtration, active transport, osmosis, and vesicular transport. Lab activities include simple diffusion (tea), osmosis (eggs), and filtration.
- Covered in lecture only. Structure of muscle cells, how they contract including nerve signal, energy sources, fatigue. Videos included, and students act out a contracting sarcomere.
- Lecture only. Structure of neurons, gated channels, graded potentials, action potentials, myelin, and synaptic transmission. No demos but some videos.
- Lecture only. How hormones affect target cells, regulation of hormone levels, functions of hormones. Videos used.

- Lecture: 3 stages of urine production and how they are regulated. Videos. Lab: Urinalysis and working through urine production with beads as per workshop at HAPS Annual 2019.

Respondent #85:

- end of week 2, all of week 3. My courses are flipped so they watch my lecture videos, come to class to engage in various active learning activities. The physiology lab we use demonstrates passive transport using RBCs in unknown solutions to assess rate of hemolysis. Again, video lectures, active learning in class, two lecture periods. Utilizing Mastering animations is a huge help.
- Our muscle phys lab utilizes a frog gastrocnemius and a force transducer. 2 parts: demonstrating motor unit recruitment and muscle twitch summation.
- I present neurophys out of order from the typical A&P text, teaching it before skeletal muscle phys. Again, flipped for 2.5 lecture periods. Mastering animations again. Mastering virtual neurophys lab.
- Lecture, see above with emphasis on pathways. For 2.5 lecture periods. Lab is a plasma glucose tolerance test. Diabetes is utilized as a "running problem" throughout A&PII, starting with this chapter.
- The link between endocrine, nephron mechanisms to maintain fluid, electrolyte and pH balance (and circling back to respiratory) is emphasized. Lab is a simple urinalysis lab, followed by a challenging problem set.

Respondent #86:

- Discussed during the first exam unit to talk about transport, about 2 weeks into the course. We usually spend about 2 lectures on this topic and then regularly refer to it in relevant context.
- We diagram the transport processes, then apply the material by considering how various pathologies and toxins might affect muscle contraction.
- A similar process as the one for the muscular system is done here. Lot's of diagramming and application.
- Not covered in the Fall semester, but covered briefly in A&P 2.
- Covered in A&P 2. Diagrams.

Respondent #87:

- Week 2 - Spend 3-4 hours of lecture and 3 hours of lab. Traditional lecture notes; group work in lecture (use of premade flashcards to quickly review cell structures and functions in groups before giving students prompts/challenges such as "Build a protein incorporating as many cell structures (flashcards) as possible "); lab that includes interactions with cell membrane models, animations, and simulations.
- This is incorporated into lecture - I start with a version of the HAPS guided inquiry activity for skeletal muscles before transitioning into a more traditional lecture; Neuromuscular junction is covered in depth with review activities in lecture; Our lab activities for skeletal muscles focus on reflex action (about 6 hrs total).
- Currently I use a portion of the PhysioEx neurophysiology lab and construct a "map" of the peripheral nervous system including NT and receptors. In lecture we cover the cellular structure of a neuron, gated ion channels, chemical receptors, sympathetic vs parasympathetic systems, etc. (about 9-12 hours total).
- We use a version of the "rat lab" where students need to predict what hormones were administered to which rats. We also take time to "map" out the hormones related to the

hypothalamus/pituitary. Cellular structure is not covered as in depth with this unit as we focus on the physiological effects of the different hormones.
- In lecture we discuss filtration, reabsorption, secretion on a cellular level looking at the cell structures and membrane transporters involved in movement of substances. Lab consists of a urinalysis. (6 hours)

Respondent #88:
- 3rd week of a traditional 15-week semester. It is covered for a full week but then pulled back into discussion multiple times later.
- Lecture followed by later recitation session group activities to work through components & order of processes, then effects of various "problems" that could be encountered.
- Same general format as for muscular system.
- Very little specific physiology covered; concepts only
- Little cell physiology covered; it is mostly full-organ processes without the specifics of what individual cells are doing..

Respondent #89:
- In A&P1, the first week or so of class we cover cell adhesion, the ECM, gap junctions, etc. There is also a broad overview of physiology of tissues, (mitosis, the lifecycle of a keratinocytes, how melanocytes make melanin), but no assignments other than lecture and PollEverywhere questions. In A&P2, we cover cell chemistry in our first class meeting with a problem set of group questions.
- For muscles, we do a POGIL on sarcomeres, and have an in-class group activity that explores membrane potential. We also walk through all the steps needed for muscle contraction, from the depolarization of the motor neuron to the end of signaling. We don't look at muscle physiology in the lab until we get to the nervous system unit (early labs focus more on anatomy; later labs are on physiology). Those labs look at muscle activity during different activities, grip strength and fatigue, reflexes vs reactions, and then ask students to design their own experiment to carry out.
- In the first week of this unit, we cover local and action potentials in lecture, through a POGIL, and through a Jeopardy review. In lab, we go through a month-long nervous system modeling project, and also have spinal nerve and cranial nerve labs that test function (reactions vs reflexes, general senses, special senses).
- Early in this unit, we discuss how cells make hormones and cell signaling pathways. There are 2 weeks spent on this unit, and our second lab focuses on blood glucose and asks for an understanding of how hormones play a role and what they do. In my synchronous class, students completed group Jamboard assignments for the effects of different hormones (signal cascade and its ultimate effect.) They also did a case study on thyroid function.
- In synchronous sessions, students did a nephron activity that took them through all the steps of urine production, and a case study of osmolarity and urine volume. In lab, they did a bead exercise (thanks Tom!) that helped them model filtration. At least 4 lectures focused on the physiology of the urinary system and homoestasis.

Respondent #90:
- 2
- 20 minutes - guided inquiry activity
- 60 minutes - guided inquiry activity

- 60 minutes - guided inquiry activity
- I skip this one ..

Respondent #91:

- Week 2 begins transport. Perusall reading assignment, transport questions assigned and attempt completed before class, review with classmates and make concept maps, use maps to complete application-level quiz, apply concepts to digestive system PowerPoint
- Apply what has already been learned about equilibrium potential and reflex pathways. Start with ticket to class on equilibrium pot of nAChRs based on mixed permeability, Perusall reading assignment, short lecture on nmj, excitation contraction, contraction relaxation. Discuss correlation between force and cross bridges, interrupted lecture on factors that affect force, exploration of these factors in lab with iworx equipment
- Starts with concept of membrane potential then up to graded and action potential and mapping onto a neuron and reflex with reading, tickets to class, in class quizzes, in class demonstrations, simulation
- This is a system I don't spend a lot of time on. I use it as a way to apply the basic concepts we review in the unit one cell physiology review. Using same strategies as above
- Same as above. Sometimes use virtual lab

Respondent #92:

- Cell physiology is the first set of lectures the students receive. Students receive 5 hours of lectures in cell physiology (including labs). In lab, we talk about the movement of water across plasma membranes using red blood cells as a model. We place RBCs in different osmotic solutions and predict how they will respond (swell, shrink, burst etc...)
- For my section, I teach general cell physiology. I teach principles like Nernst equations, membrane potential, electrochemical gradients, equilibrium potentials and diffusion.
- I do not teach cell physiology in the muscular system.
- This system is not covered. (not by me)
- This system is not covered. (not by me)
- This system is not covered. (not by me)

Respondent #93:

- Cell Physiology is taught in the first week. About 5-6 classes are devoted to it. Lecture/ brief small group discussion activities.
- Skeletal muscle: 1-2 classes Cardiac muscle: 1 class Smooth muscle: Nothing devoted specifically, discussed in a systems context, e.g. smooth muscle in blood vessels, GI tract.
- Six classes, mix of lecture and small group.
- 5-6 classes, mix of lecture and small group.
- 5-6 classes, mix of lecture and small group.

Respondent #94:

- Week 1: Beta cell release of insulin
- CALCIUM: channels, SR, troponin
- Na/K/ATPase, channels, neurotransmitter effects, electrochemical gradients
- Receptor-ligand binding, enzyme cascade, GPCR, antagonistic control
- Bicarb equation, SGLT, transport maximum,

Respondent #95:

- Membrane structure, simple and facilitated diffusion, osmosis, filtration. Maybe 3 lectures, 1 lab activity.
- Sarcolemma, triads, myofibrils, impulse transmission, sliding filaments, cross-bridge cycling, energetics. 6 lectures, 1 lab.
- Resting membrane potential, local changes, graded responses, action potential generation and propagation, synaptic transmission. 6 lectures, 0 lab.
- Steroid and non-steroid mechanisms on target cells, hypothalamic and pituitary hormones, thyroid hormones, adrenal hormones, pancreatic hormones. 5 lectures, 1 lab.
- Nephron structure, filtration, reabsorption, secretion, countercurrent concepts, influence of hormones. 5 lectures, 1 lab.

Respondent #96:

- This is covered by lecture material and publisher resources such as animations. This is covered by lecture material and publisher resources such as animations.
- In the human physiology lab, we do a set of experiments (EMG, Muscle strength, fatigue, tetanus, etc) within Adinstruments Lt
- This is covered by lecture material and publisher resources such as animations. In the human physiology lab, we do a set of experiments (EEG, nerve velocity, muscle stimulation and tetanus) within Adinstruments Lt
- This is covered by lecture material and publisher resources such as animations.
- This is covered by lecture material and publisher resources such as animations. In the physiology lab we cover it by doing simple urine analysis: osmometry, fake urine, urine strips, etc.

Respondent #97:

- second week of the course; we have typically 3 lecture periods and one lab activity on diffusion/osmosis
- One lab exercise via software
- I allot one lecture class period for review of the anatomy of the nervous system/neuron. I have about 2 weeks on function of the neuron: Action and synaptic potentials, and receptors
- This system not covered
- I'll cover the basic renal processes in about 2 leture periods, but no lab activities

Respondent #98:

- 2nd or 3rd week and then throughout the course cells general emphasis on osmosis with clinical problems and egg lab.
- lectures and animations on action potential and sliding filament theory
- lectures and animations on action potential and in Lab practice doing cranial nerve and reflex testing.
- Clinical problems, triggers and actions.
- goes back to diffusion and osmosis applied

Respondent #99:

- We start the cells in the second lab and second week of lecture. One lab (an hour) and two lectures (three hours total) spent on cells. Video on organelle functions, identify organelles on models in lab.

- In one of the semesters, we cover muscle fiber structures and functions in one lecture session (1.5 hours) and have publisher video clips.
- In one of the semesters, we cover nervous tissue in two lecture sessions (3 hours)
- In one of the semesters, we cover endocrine modes of actions in part of a lecture session (20 minutes) and have publisher video clips.
- In one of the semesters, we cover kidney structure/function in two lecture sessions (3 hours)