



**SOUTH DAKOTA BOARD OF REGENTS  
ACADEMIC AFFAIRS FORMS**

**Revisions to General Education Requirements**

USD	Health Sciences	<i>Elizabeth M. Freeburg</i>	10/25/2018
Institution	Division/Department	Institutional Approval Signature	Date
<i>June Larson</i>		<i>Michael Lawler</i>	10/1/18
Form Initiator		Dean's Approval Signature	Date

Prefix & No.	Course Title
HSC 280/HSC 280L	Essentials of Human Anatomy and Physiology/Lab

**Indicate (X) the component of the General Education Curriculum that the proposal impacts.**

System General Education Requirements

**Indicate (X) the revision(s) that is being proposed (more than one may be checked).**

Revision to an approved course

Addition of a course to the set of approved courses

Deletion of an approved course from the set of approved courses

**Section 1. Provide a Concise Description of the Proposed Change**

Add HSC 280/HSC 280L Essentials of Human Anatomy and Physiology (5 credits) to the current list of coursework to meet SCR Goal #6: Natural Sciences.

**Section 2. Provide the Effective Date for the Proposed Change**

2019-20 Catalog

**Section 3. Provide a Detailed Reason for the Proposed Change**

Essential knowledge and skills of anatomy and physiology learned in HSC 280/280L help students gain understanding and awareness of this science. During this course, learners focus on mastering critical thinking skills and on using the scientific approach and vocabulary in problem solving and class discussions. In addition, it provides the necessary knowledge that is foundational to work in the healthcare industry in support positions including clinical analytics, coding, billing, insurance claims, public health and other areas of health care such as paramedic practice and sports medicine. Including this five credit hour course as a general education course will be a huge benefit for those individuals seeking careers in health care such as those mentioned above.

Adding HSC 280 to the general education courses will benefit a number of students currently enrolled at USD in health sciences and sport sciences and in addition will benefit transfer students.

This change will assist graduates of health programs at community colleges who wish to transfer in a combined A&P course to receive credit for their previous A & P courses. Currently they have to take additional sciences to meet the general education requirements. This becomes a barrier to students considering a transfer to the University. This change will benefit USD with increased transfer students because they are more likely to choose an institution based on where they get the most credit for their previous education.

**Section 4. Provide Clear Evidence that the Proposed Modification will Address the Specified Goals and Student Learning Outcomes**

Objectives	Specific Learning Outcomes
1. Explain the nature of science including how scientific explanations are formulated, tested, and modified or validated.	<p><i>Artifact 1: Case Study Muscle weakness</i>  <i>Students provide answers to the questions while constructing supporting evidence to answers.</i>  <i>Case studies create a positive impact on higher order thinking and provide an opportunity for knowledge improvement, and incremental learning.</i></p> <p><i>Artifact 2</i></p>
2. Distinguish between scientific and non-scientific evidence and explanations, and use scientific evidence to construct arguments related to contemporary issues.	<p><i>Artifact 3</i></p>
3. Apply basic observational, quantitative, or technological methods to gather and analyze data and generate evidence-based conclusions in a laboratory setting.	<p><i>Artifact 3</i>  <i>Artifact 4</i></p>
4. Understand and apply foundational knowledge and discipline-specific concepts to address issues, solve problems, or predict natural phenomena.	<p><i>Artifacts 1, 2, &amp; 3</i></p>

**Section 5. Provide a Copy of all Course Syllabi and Other Supporting Documentation**

Attached



**HSC 280 Essentials of Anatomy and Physiology (5 credits)**

Faculty: Musheera Anis, MD ,PhD
Office: Beacom Hall, Room 312
Office Hours: Tuesdays 1-3 PM, Wednesdays 1-3 PM, and by appointment
Cell Phone: 605-553-1545
Office Phone: 605-677-3928
E-mail: Per department policy, send all course-related communication through D2L mail only.
Other E-mail that is not specifically course-related can be directed to <a href="mailto:Musheera.AnisAbdellatif@usd.edu">Musheera.AnisAbdellatif@usd.edu</a>
Class Meeting Dates/Times: Tuesdays & Thursdays 9:30 a.m. to 12:15 pm Lee Med Room 105
Delivery Method: Face-to-Face

The Department of Health Sciences supports *inclusivity* -the state of all-embracing that is culturally attune, and which incorporates the needs and viewpoints of diverse communities to create an environment that feels welcoming to everyone, and where each individual feels he/she is valued.

## I. Course Description

Essentials of Anatomy and Physiology is designed to introduce students to essential concepts in anatomy and physiology, including basic chemistry, cell and tissue studies, and an overview of all the body systems. Students are introduced to critical thinking through Learn Smart modules and a virtual anatomy and physiology lab.

## II. Course Prerequisites

### A. Previous courses/experience:

None

## III. Course Goals

This course falls under the System-wide Graduation Requirements (SGR) goal of Expertise, with students focusing on one or more areas of in-depth study through their major and minor coursework, developing a level of expertise that will serve them not only in their intended career but also as educated citizens.

## IV. Student Learning Outcomes:

Upon completion of this course the student will:

1. Understand and use anatomical terminology to describe and label body directions and planes.
2. Identify the structure and components of the cell and its function.

3. Describe the structure and function of the different types of tissue.
4. Name and identify the gross anatomy of the major systems.
5. Relate biological structure and function of the various body systems.
6. Explain interrelationships among molecular, cellular, tissue, and organ functions in each system.
7. Describe the contributions of organs and systems to the maintenance of homeostasis.
8. Apply inquiry and problem-solving skills to actual case-studies.

**IV. Program Outcomes:** HSC 280 & 280L are designed to assist the student in developing the following outcomes of the intended eight end-of-program outcomes for the health sciences major:

Communication  
Professionalism  
Teamwork  
Problem Solving  
Valuing

#### **VI. Required Textbook(s)**

This course will be available via McGraw Hill Connect, an online virtual website in which the course e-book is available: *Seeley's Essentials of Anatomy and Physiology* (VanPutte, 9<sup>th</sup> ed.). You are required to purchase the Connect access regardless of your book choice (hardcover text, e-book, or leaflet). Within Connect, you will also have access to and assignments in **Anatomy and Physiology Revealed 3.0** (APR 3.0) which is an interactive anatomy resource, as well as a virtual lab system known as **PHiLS (Physiology Interactive Lab Simulations)**.

**First access the Connect website at the following url:**

<http://connect.mheducation.com/class/m-anis-fall-18-hsc-280-280l>

**Next register within Connect by entering your email address and then choosing one of three options:**

1. Enter the access code included in the textbook package you may have already purchased at the bookstore.
2. Purchase access directly online
3. Start a free trial. Note that "Start Free Trial" enables students to register in Connect Plus without entering or purchasing an access code, yet the student will have free access for 3 weeks at which time the student will be prompted to purchase access. This option is convenient for students waiting for financial aid, those who may drop the course, or students who want to try the Connect Plus ebook before they buy the online option.

#### **Getting Technical Support**

If having trouble registering or accessing Connect, please contact McGraw-Hill's Customer Support for the fastest help. Live chat, email, and phone support are available almost every hour of the day.

Website: [www.mhhe.com/support](http://www.mhhe.com/support)

Phone: (800) 331-5094

Hours (EST)

Sunday: 12 PM - 12 AM

Monday - Thursday: 24 hours

Friday: 12 AM - 9 PM

Saturday: 10 AM - 8 PM

Ensure your computer meets system requirements by going to this link:

<http://connect.mheducation.com/connect/troubleshoot.do>

**\*\*Optional text books:**

Hull, K. L. (2010). *Coloring atlas of the human body*. Lippincott Williams & Wilkins.

**VII. Instructional Methods**

- Course Readings: Text book and readings posted in D2L.
- In Class Activities and Assignments will include lecture, case studies, class discussion, video clips, presentations and hands-on activities and projects.
- Small group discussion
- PHiLS (Physiology and Interactive Lab Simulation)
- Within APR 3.0, the following study areas will be used: virtual dissection and histology; animations, and imaging

**VIII. Evaluation Procedures**

1. Learn Smart Study Modules (20%)
  2. Class Activities (20%) Class attendance and participation assessment will be based on student involvement in class discussions and class assignments.
  3. Chapter Quizzes (20%)

**The following evaluation methods and percent weight for grading will be used for the lab portion:**

1. APR = Anatomy and Physiology Revealed (20%)
2. PhILS = Physiology Interactive Lab Simulation (20%)

**All assignments need to be completed and submitted by 11:59 PM CST on the due date.**

Date	Chapter in Seeley's	APR Module	PHiLS Lab
	1 The Human Organism	Body Orientation	
	2 The Chemical Basis of Life	Cells and Chemistry	
	3 Cell Structures and Their Function	Cells and Chemistry	

	4 Tissues	Tissues	
	5 Integumentary System	Integument	
	6 Skeletal System: Bones and Joints	Skeletal	
	7 Muscular System	Muscular	The Length-Tension Relationship
	8 Nervous System	Nervous	The Compound Action Potential
	9 Senses	Nervous	Refractory Periods
	10 Endocrine System	Endocrine	Thyroid Gland and Metabolic Rate
	11 Blood	Cardiovascular	pH and Hb-Oxygen Binding
	12 Heart	Cardiovascular	Starling's Law of the Heart
	13 Blood Vessels and Circulation	Cardiovascular	EKG and Exercise
	14 Lymphatic System and Immunity	Lymphatics	Cooling and Peripheral Blood Flow
	15 Respiratory System	Respiratory	Exercise-Induced Changes
	16 Digestive System	Digestive	Glucose Transport
	17 Nutrition, Metabolism and Body Temperature Regulation	Digestive	a. Basal Metabolic Rate b. Cyanide and Electron Transport
	18 Urinary System and Fluid Balance	Urinary	Resting Potential and External K and Na
	19 Reproductive System	Reproductive	

### **Grading for Coursework Required within the Major**

1. The grading scale used for all HSC prefix coursework is:
  - a. Grade A      90 – 100%      900-1000
  - b. Grade B      80 – 89%      800 to 899
  - c. Grade C      70 – 79%      700 to 799
  - d. Grade D      60 – 69%      600 to 699
  - e. Grade F      59% and below      0-599
2. A maximum of 1000 points can be earned in this course.
3. Grades will be posted in D2L.
4. No extra credit can be earned in any HSC prefix course.
5. Assignment and Course Completion:
  - a. Any course assignments that are not submitted by the established deadline will result in a grade of zero (0) for the assignment.
  - b. The final course grade may be reduced by up to 15% of the total points earned for behavior that is not consistent with that expected of a professional person, including late assignments or failing to hand in completed assignments. For example if you earn 800 points for completed work, but chose to not complete an assignment, your course grade earned could be a “D”. This is calculated in the following manner: Fifteen percent (15%) of 800 points is 120 points (800 – 120 = 680 which is a 68% or a “D”).

### **IX. Electronic Communication:**

1. Because of ever-increasing reliance on electronic communications to more effectively and efficiently conduct official business with students of the University of South Dakota, certain electronic communication standards must be set by the University. As a result, email and announcements posted in myUSD Portal are considered official forms of communication at the University of South Dakota. It is imperative students understand that portal announcements and the University assigned e-mail addresses associated with the USD account shall be the official means of communication while they are a student and that they are responsible for information conveyed via announcements and email. The University has the right to expect that those communications be read in a timely fashion.
2. All formal electronic communication between the department faculty and student will occur via the D2L communication system. You can forward D2L email to your University coyote.edu address.
3. You cannot respond to an email sent from D2L through your coyote account. You will still need to respond to the email through D2L.
4. For more information on using D2L please visit the portal: <https://d2l.sdbor.edu/>

#### **X. Technology Requirements:**

1. Students registered for HSC 280 & 280L are required to have internet access and a current USD e-mail address. All computers should be able to run the latest editions of operating systems and programs utilized during the course. All course communication will be facilitated within D2L including notices and updates, assignments, drop-box submissions, and grades. Please contact the USD Information Technology Services Help Desk for assistance with D2L. Office: Slagle Hall Room 18B, (605) 658-6000, <https://portal.usd.edu/technology/helpdesk/>
2. **Internet browser:** Refer to CDE Online Orientation for this information. The orientation guide contains important information on accessing USD's resources available to you online. <http://www.usd.edu/continuing-and-distance-education/upload/Online-Orientation-Guide.pdf>
3. **Information Technology Services (ITS):** The ITS Help Desk provides prompt, knowledgeable and courteous computing support services.
  - a. ITS Help Desk is located in the I.D. Weeks Library, Room # 104.
  - b. Online Request Form - Create a support ticket with the ITS Help Desk Email Available 24x7: <https://portal.usd.edu/technology/helpdesk/>
  - c. Phone Available 24x7
    - i. On Campus: 605-658-6000
    - ii. Toll Free: 877-225-0027
  - d. ITS is closed on university holidays
4. **Desire2Learn - D2L:** Desire2Learn (D2L) is a course management system that is used by all South Dakota Board of Regents Universities. The Department of Health Sciences faculty uses D2L for all coursework, whether it is delivered on or off-campus. All coursework materials are provided within the D2L course and are available electronically to students 24/7. All course communication is facilitated within D2L

including lecture notes, slides, assignments, drop-box submissions, and grades.

4. **Turnitin:** The Department of Health Sciences requires all writing assignments for the Health Sciences Major to be submitted to Turnitin to check for plagiarism. For your convenience, TurnItIn has been integrated directly into the D2L Dropbox tool.
  
5. **Collaborate Ultra:** Collaborate Ultra may be used for class participation and to share information and documents in an online session. Collaborate Ultra is a new, user-friendly version of Collaborate, available on desktops, laptops, and mobile devices. For the best experience using Collaborate Ultra, participants should use Google's Chrome web browser. For an orientation guide please visit: [https://docs.google.com/document/d/192rZjeIy25tP261-fmE9Q7YQjly\\_tkT66zF891\\_0oPo/edit?ts=57966337](https://docs.google.com/document/d/192rZjeIy25tP261-fmE9Q7YQjly_tkT66zF891_0oPo/edit?ts=57966337)

#### Grade Sheet for Student Use

<b>HSC 280 GRADE SHEET</b>			
<b>Requirements</b>	<b>% Grade</b>	<b>Points Possible</b>	<b>Points Earned</b>
In-Class & Supplemental Activities	20	200	
Chapter Quizzes	20	200	
Learn Smart Study Modules	20	200	
APR = Anatomy and Physiology Revealed	20	200	
PhILS = Physiology Interactive Lab Simulation	20	200	
Total Points Possible	100%	1000	
Total Points Earned			
Course Grade Earned	Percentage		Letter Grade

## **Policies**

### **University of South Dakota Student Handbook**

<http://www.usd.edu/~media/files/student-life/usdstudenthandbook.ashx>

### **Student Accountability:**

It is the responsibility of the student to know and to adhere to the policies, procedures, and deadlines of the University and the Department of Health Sciences.

## **Disability Services: Accommodation Process**

<http://www.usd.edu/student-life/disability-services/accommodation-process>

Any student who feels he/she may need academic accommodations or access accommodations based on the impact of a documented disability should contact and register with Disability Services during the first week of class. Disability Services is the official office to assist students through the process of disability verification and coordination of appropriate and reasonable accommodations. Students currently registered with Disability Services must obtain a new accommodation memo each semester.

For information contact:

Ernetta L. Fox, Director  
Disability Services  
Room 119 Service Center  
(605) 677-6389

## **Professional Standards of Conduct:**

Professional conduct is expected of every student enrolled in Health Sciences coursework, whether he/she is a declared major or not. Professional conduct is evidenced in behaviors which represent:

1. Ethical conduct
2. Integrity and honesty
3. Accountability
4. Respect for oneself, others and the rights of privacy and confidentiality
5. Appearance and communication consistent with a professional.
6. Respectful behavior in interpersonal relationships with peers, superiors, clients, and their families
7. Adherence to deadlines set by the faculty

## **Professional Behaviors Grade**

Students in the Department of Health Sciences are expected to exhibit professional behavior. Evaluation of professional behaviors is incorporated into final course grading. Professional behaviors include but are not limited to: honesty, integrity, accountability, attendance, participation, professionalism, communication, teamwork, leadership and completion of all course assignments.

- The final course grade may be reduced by up to 15% of the total points earned for behavior that is not consistent with that expected of a professional person.
- A student who fails to exhibit professional behaviors may be dropped from the course, based on the discretion of the instructor.
- A student may be dismissed from the department for unprofessional behavior at the recommendation of the Health Sciences faculty team.

## **Course Participation**

Your active participation in the course is required and models that of the professional healthcare provider. It is important that you take responsibility for participating in course discussions and activities as required. All students are expected to read and prepare assigned materials prior to established deadlines.

### **Assignments**

All work must be submitted by the required date and time. No credit will be earned for exams or papers that are turned in after their deadlines. In addition, the final course grade may be reduced by 15% of the total points earned.

### **Academic Integrity Philosophy**

Academic integrity is a fundamental concept underlying the educational enterprise of the University. As such, the idea of academic integrity must be embraced by all who are members of the university community and must be a guiding principle in all actions of the University. Academic integrity encompasses the values of Honesty, Trust, Fairness, Respect, and Responsibility and is the foundation for the standards of acceptable behavior that apply to all within the university community.

### **Freedom in Learning**

Under Board of Regents and University policy student academic performance may be evaluated solely on an academic basis, not on opinions or conduct in matters unrelated to academic standards. Students should be free to take reasoned exception to the data or views offered in any course of study and to reserve judgment about matters of opinion, but they are responsible for learning the content of any course of study for which they are enrolled. Health Sciences students who believe that an academic evaluation reflects prejudiced or capricious consideration of student opinions or conduct unrelated to academic standards should contact June Larson, Associate Dean of the School of Health Sciences and Chair of the Department of Health Sciences to initiate a review of the evaluation.

### **Student Rights & Responsibilities Office**

#### **5. STUDENT RIGHTS & RESPONSIBILITIES**

Muenster University Center, 206  
Phone: 605-677-6030  
Email: srr@usd.edu

The office of Student Rights & Responsibilities (SRR) is charged with ensuring that the individual rights of students are upheld throughout the university community, while common standards for personal behavior are evidenced by all who enjoy USD affiliation. In addition to administering due process and adjudicating allegations of misconduct, SRR can assist with procedural questions related to **SDBOR policy 3:4**, the **Student Code of Conduct**, such as the referral process and resolution options, as well as in identifying available resources to support student success.

<https://www.sdbor.edu/policy/Documents/3-4.pdf>

<https://www.sdbor.edu/policy/Pages/Section-3-Student-Affairs.aspx>

- SRR is committed to fostering an environment of engaged citizenship for students.
- Accordingly, reasoned and civil discourse, integrity and intellectual honesty, and the recognition of the rights of all are encouraged.
- SRR aids in cultivating a campus-wide ethic of accountability through its conduct processes.

### **Student Appeals for Academic Affairs SD BOR Policy 2:9**

<https://www.sdbor.edu/policy/documents/2-9.pdf>

Students have the right to initiate the Academic Appeals Policy of the University of South Dakota as a means to redress any form of unjust, oppressive, discriminatory, or fundamentally unfair practice affecting a student's academic performance and progress. Undergraduate Academic Appeals forms may be found on myUSD Portal. For questions regarding health sciences courses, contact Academic Affairs (Slagle Hall 105, 677-6497), or the Academic Dean of the School of Health Sciences.

### **Cultural Insensitivity and Bullying**

One of the responsibilities and expectations of University of South Dakota students is that they will participate in the creation of a positive climate at USD that welcomes, comforts, and is inclusive of all students in the Residence Halls, classrooms, student organizations, and other parts of the University. Two critical issues that lead to a negative climate for and experience of diverse students are cultural acts of insensitivity and "bullying." Making fun of or degrading individuals and the groups to which they belong is considered an act of cultural insensitivity. Bullying is defined as unwanted, aggressive behavior that is repeated, or has the potential to be repeated, over time. Bullying is repeated, deliberate, and disrespectful behavior that has the intent of hurting someone else. Teasing; making fun of; laughing at, or harassing someone over time is bullying. Bullying hurts, creates a negative climate, and can disrupt another student's ability to function, sleep, concentrate, and to be academically successful.

### **Notice of Nondiscriminatory Policy**

In accordance with the South Dakota Board of Regents Policy 1:19, the institutions under the jurisdiction of the Board of Regents shall offer equal opportunities in employment and for access to and participation in educational, extension and other institutional services to all persons qualified by academic preparation, experience, and ability for the various levels of employment or academic program or other institutional service, without discrimination based on sex, race, color, creed, national origin, ancestry, citizenship, gender, gender identification, transgender, sexual orientation, religion, age, disability, genetic information or veteran status or any other status that may become protected under law against discrimination. The Board reaffirms its commitment to the objectives of affirmative action, equal opportunity and non-discrimination in accordance with state and federal law. Redress for alleged violations of those laws may be pursued at law or through the procedures established by the provisions of 1:18 of this policy. For additional information, please contact the Director, Equal Opportunity and Chief Title IX Coordinator, Room 205 - Slagle, Vermillion, SD 57069. Phone: 605-677-5651 E-Mail: [equalopp@usd.edu](mailto:equalopp@usd.edu).

Admission decisions are made without regard to disabilities. All prospective students are expected to present academic credentials at or above the minimum standards for admission and meet any technical standards that may be required for admission to a specific program. If you are a prospective student with a disability and need assistance or accommodations during the admission/application process, please contact the Director of Disability Services, 119B Service Center North, USD, Vermillion, SD 57069. Phone: 605-677-6389 Fax: 605-677-3172 E-Mail: [dservice@usd.edu](mailto:dservice@usd.edu)

Federal Law prohibits discrimination on the basis of disability (Section 504 of the Rehabilitation Act of 1973, The Americans with Disabilities Act of 1990, and the Americans with Disabilities Act Amendment Act of 2009). The University has designated Ms. Roberta Ambur, Vice President of Administration & ITS, as the Coordinator to monitor compliance with these statutes. This obligates USD and Ms. Ambur to provide equal access for all persons with disabilities.

### **South Dakota Board of Regents Policies Link**

<http://www.usd.edu/policies/south-dakota-board-of-regents>

Students shall refer to the above link for the most current versions of South Dakota Board of Regents Policies. Sections 1-3 affect all University students.

### **Student Disciplinary Code SD Board of Regents Policy 3:4**

<https://www.sdbor.edu/policy/Documents/3-4.pdf>

### **Student Academic Misconduct SD BOR Policy 2:33**

<https://www.sdbor.edu/policy/Documents/2-33.pdf>

### **Student Appeals for Academic Affairs SD BOR Policy 2:9**

<https://www.sdbor.edu/policy/documents/2-9.pdf>

### **Cheating and Plagiarism**

The Department of Health Sciences considers plagiarism, cheating, and other forms of academic dishonesty contrary to the objectives of higher education. A student who engages in any form of academic dishonesty will be referred to the Office of Student Rights and Responsibilities.

#### **Plagiarism**

The Department of Health Sciences accepts the definition of plagiarism as intentionally or knowingly representing the words or ideas of another as one's own in any academic exercise. In the event a faculty member has reason to believe a student has plagiarized another's work, the case will be referred to the Office of Student Rights & Responsibilities.

#### **Recycled Work: Self-Plagiarism**

- a. Students may not submit academic work or portions of the academic work for which academic credit has already been received to use towards meeting current course requirements without prior permission from the instructor of the course in which they are currently enrolled.
- b. Submitting an assignment or portions of an assignment which has already received credit will result in referral to the Office of Student Rights & Responsibilities.

**VAIL (Virtual Academic Integrity Laboratory) Tutor**

- a. The completion of Vail Tutor is required once per academic school year with a minimum score of 90%.
- b. The tutor is available at <http://www-apps.umuc.edu/vailtutor/>. The tutor consists of 4 modules:
  - Module 1: Understanding Academic Integrity, Plagiarism, and Cheating
  - Module 2: Understanding How to Avoid Plagiarism: tips and Strategies
  - Module 3: Documentation Styles: When and How to Use them
  - Module 4: Plagiarism Policies
- c. There is a quiz at the end of the tutorial that covers all four modules. After completing and scoring the quiz, your Report of Successful Completion will be available to you. You may retake the quiz as often as needed to achieve the required score. Once you have received the required score, you will need to copy or print and scan your Report of Successful Completion and save. You will then submit the saved Report of Successful Completion to the drop box for this assignment.

**Instructor response time to e-mail, phone, and questions for the Instructor Discussion Board postings:**

- I will check messages once during the day Monday through Friday and I will respond by the next business day.
- Weekend messages will be returned as soon as possible on the next business day.
- Instructor feedback to discussion board assignments will be posted within one week of the due date for the assignment.

**NOTE: Feedback on written assignments and assessments will be provided within two weeks of the due date.**

Student Learning Outcomes	Course Specific Learning Outcomes
1. Explain the nature of science including how scientific explanations are formulated, tested, and modified or validated.	<i>Artifact 1: Case Study Muscle weakness            Students provide answers to the questions while constructing supporting evidence to answers.            Case studies create a positive impact on higher order thinking and provide an opportunity for knowledge improvement, and incremental learning.</i>

	<i>Artifact 2</i>
2. Distinguish between scientific and non-scientific evidence and explanations, and use scientific evidence to construct arguments related to contemporary issues.	<i>Artifact 3</i>
3. Apply basic observational, quantitative, or technological methods to gather and analyze data and generate evidence-based conclusions in a laboratory setting.	<i>Artifact 3</i> <i>Artifact 4</i>
4. Understand and apply foundational knowledge and discipline-specific concepts to address issues, solve problems, or predict natural phenomena.	<i>Artifacts 1, 2, &amp; 3</i>

## **Artifact 1: Case Study: Muscle Weakness**

**Chief Complaint:** A 26-year-old woman with muscle weakness in the face.

**History:** Jill Rothman, a 26-year-old gymnastics instructor, presents with complaints of muscle weakness in her face that comes and goes, but has been getting worse over the past two months. Most notably, she complains that her "jaw gets tired" as she chews and that swallowing has become difficult. She also notes diplopia ("double vision") which seems to come on late in the evening, particularly after reading for a few minutes. At work, it has become increasingly difficult to "spot" her gymnasts during acrobatic moves because of upper arm weakness.

On physical examination, she has notable ptosis ("drooping") of both eyelids after repeated blinking exercises. When smiling, she appears to be snarling. Electromyographic testing revealed progressive weakness and decreased amplitude of contraction of the distal arm muscles upon repeated mild shocks (5 shocks per second) of the ulnar and median nerves. Both her symptoms and electromyographic findings were reversed within 40 seconds of intravenous administration of edrophonium (Tensilon), an acetylcholinesterase inhibitor (i.e. an "anticholinesterase"). Blood testing revealed high levels of an anti-acetylcholine receptor antibody in her plasma, and a diagnosis of myasthenia gravis was made.

Jill was treated with pyridostigmine bromide, which is a long-acting anticholinesterase drug, and was also started on prednisone, which is a corticosteroid drug. She also underwent occasional plasmapheresis when her symptoms became especially severe. She was given a prescription of atropine as needed to reduce the nausea, abdominal cramps, diarrhea, and excessive salivation she experienced as side effects of the anticholinesterase drug.

### **Questions:**

1. Why is this young woman experiencing difficulty chewing and double vision? Support your answer with information obtained from the presentation of this case.
2. How are the anti-acetylcholine receptor antibodies interfering with her normal skeletal muscle activity?
3. How do the anticholinesterase drugs act to improve Jill's skeletal muscle function?
4. Why are nausea, abdominal cramps, diarrhea, and excessive salivation all side effects of the anticholinesterase drug she is taking?
5. Why is atropine beneficial in treating the gastrointestinal side effects mentioned in question #4?
6. Why does repetitive nerve stimulation result in decreased amplitude of the muscle contractions?
7. How will the corticosteroid prednisone benefit this patient?
8. Why must Jill undergo plasmapheresis when her symptoms become especially severe?
9. Jill's doctor advises her that she is at increased risk for respiratory failure. Explain why this is so.

### **Artifact 2: Critical Thinking Question**

Benzene is a chemical that destroys bone marrow and may cause Aplastic anemia. What symptoms would you expect as a result of the lack of

- (a) RBCs
- (b) Platelets
- (c) WBSs

**Explain your answer using the framework discussed in class today.**

### **Artifact 3: Role of microbiome in Human physiology and health**

#### Step 1:

Students are instructed to work collaboratively within groups using Google Docs.

Students are presented with a number of statements and asked to take a stance ranging from “Strongly Agree,” “Agree,” “Disagree” and “Strongly Disagree.”

Students are asked to explain why they chose a particular response. Students express their opinions without judging any opinions as right or wrong.

Statements:

- Microbes are mostly bad.
- Microbes represent many diverse types of living things.
- You need very expensive equipment to study microbes.
- Some diseases are caused by non-living particles.
- The media plays an important role in how the public views microbes.
- The only good microbe is a dead microbe.
- Antibiotics cause microbes to mutate and become resistant to antibiotics.
- All members of a species of bacteria, such as E. coli bacteria, are all the same.
- Antibiotics are needed to treat a cold or flu.
- We are no longer in jeopardy of suffering from bacterial infections of epidemic proportions since the development of antibiotics.
- Doctor’s inappropriately prescribe antibiotics on a regular basis.
- The idea of the “superbug” (antibiotic-resistant bacteria) is an unjustified public fear.
- I am not at all concerned about bacterial resistance

#### Step 2:

Each group of students are assigned a body region (mouth, respiratory tract, stomach, intestines, urogenital tract, or skin). Using the following prompt:

Microbes living in and on the body perform beneficial functions that help keep us healthy.

Find 3 peer-reviewed research articles that explore the microbiota in your assigned region and answer the following questions:

- 1) What is the role of the microbiome in health and disease as it relates to the assigned region of the body?
- 2) What do you think are the most important factors influencing microbes in this region?
- 3) Can the microbiome be manipulated to alter disease conditions?
- 4) What are your recommendations to maintain a healthy microbiome in this region?

Students explore the following resources:

- 1) Harvard outreach animation on the microbiome:

2) Learn Genetics microbiome overview

<https://learn.genetics.utah.edu/content/microbiome/friends/>

3) <https://www.scientificamerican.com/article/could-multiple-sclerosis-begin-in-the-gut/>

4) Research articles:

Canny, G. O., & McCormick, B. A. (2008). Bacteria in the intestine, helpful residents or enemies from within?. *Infection and immunity*, 76(8), 3360-3373.

Frank, D. N., Feazel, L. M., Bessesen, M. T., Price, C. S., Janoff, E. N., & Pace, N. R. (2010). The human nasal microbiota and *Staphylococcus aureus* carriage. *PloS one*, 5(5), e10598.

Grice, E. A., & Segre, J. A. (2012). The human microbiome: our second genome. *Annual review of genomics and human genetics*, 13, 151-170.

Stark, L. A. (2010). Beneficial microorganisms: countering Microbephobia. *CBE—Life Sciences Education*, 9(4), 387-389.

Step 3:

Student groups create a PPT to present findings to class. A work cited slide is required.

Step 4:

At the conclusion of this activity, the original statement posited at the beginning of this activity is revisited and students share if their stand has changed as a result of the research done.

#### Artifact 4: Physiology lab “Exercise Induced Changes”

Using the Ph.I.L.S lab “Exercise Induced Changes”, students explore the following objectives:

- Monitor the breathing of a student volunteer and display the signal on the screen of a virtual computer
- Measure the inspiratory reserve volume, the tidal volume, and expiratory reserve volume
- Explain the changes in breathing patterns when the volunteer exercises

A pre-lab quiz follows with questions that quiz the student on their understanding of tidal volume, alveolar ventilation, the body’s oxygen requirements during exercise, and change in tidal volume and rate of breathing during exercise

Students measure and record volunteer’s tidal volume, inspiratory reserve volume, expiratory reserve volume, and time interval between breaths under resting conditions and then under exercise conditions.

Ph.I.L.S. Physiology Interactions Lab Simulations

RESPIRATION > 35. Exercise-Induced Changes

OBJECTIVES & INTRODUCTION PRE-LAB QUIZ WET LAB LABORATORY EXERCISE POST-LAB QUIZ & LAB REPORT

DATA ACQUISITION UNIT

Stimulator Outputs Recording Inputs

Power + 1 - 2

Exhale

Inhale

CONTROL PANEL

Resting

After Exercise

START

DATA

AMP 456

TIME 2.7

STEPS: 1 2 3 4 5 6 7 8 9 10 11 12 13 VIEW ALL

Continue measuring tidal volumes from the [second peak](#) and [trough](#) on the trace and then from the [third peak](#) and [trough](#); you will have recorded three values. Click the [Journal button](#) each time to enter the value into the Journal.

Journal

This is followed by a post-test in which students are asked a number of questions about the data that was collected and the differences in recorded data between resting and exercise conditions.

Example: Look at your data for vital capacity, Exercise:

1. Significantly increases vital capacity.
2. Did not change vital capacity.
3. Significantly decreases vital capacity.