Faculty Development Plan

Having obtained my education and training in three very different educational systems I have always imagined teaching as a way of righting the wrongs and maintaining the positive experiences I had. My professional life as a scientist has always been about teaching and learning. When I have approached a scientific question it is normally something for which we have no answer yet. Then through mentors and collaborators I have designed a logical approach towards the answer. Inevitably, I have been placed in both the learner's and the teacher's shoes. Tackling questions without an answer makes me curious, but I remain an expert in other aspects of the strategy. My collaborators and mentors have a similar experience as they advise me. It is impossible to only teach or only learn. Teaching is learning. I have had experiences in educational systems that follow the political environment of the country. For example, all my years as a student, almost to the end of my college experience, teachers were mostly dictators, demanding learning outcomes they did not contribute to. The value of a student's progress was null. In other places, my experience reflected the enthusiasm shown by the teachers to further the students into careers. In Israel, for example, all undergraduates were much older due to their Military Service of 3 years. Teachers constantly made adjustments in class to accommodate student's work schedule or other duties like family. Teaching has become my passion. Passion does not equate to understanding. Because of my past experiences, I know there is much to learn to be a great teacher and a great mentor. I aspire to be both. I aspire to use my title of "Child of God" to enlist His help. I aspire to do the best I can to position BYU students at the doorsteps of acceptance in whatever future professional goals they have.

Teaching goals:

PDBio 365

My first assignment for teaching was PDBio 365, Pathophysiology. This class is a great opportunity to learn about the workings of the body while under duress. Sickness derived from the environment, our own genes, etc. are only a few of the examples in which our bodies need to respond in such a manner to lead us back to health. Many of the students enrolled in this class have in mind the Healthcare industry. I think this class is perfect to help them reflect on their goals and strengthen their path to a life of service. During my first time to teach Pathophysiology (PDBio 365) one comment that was consistent among students was the lack of organization. As the first time teaching I relied mostly on previous organizations and material. As the semester unfolded, I tried to make some changes but only made the material more confusing as the style of the lectures was changing. The lack of organization resulted also in poor perception of the relevance of the material.

In the Fall 2018, several things will be different. First, the class will grow from 16 students to 120 students. Second, I will implement Team-based learning. The syllabus includes re-organization of the material. A set of 20 revised lectures will overview crucial aspects of disease with special emphasis on disease responsible for the most death in the US and in the world. Additionally we will review in each lecture the recurring questions that make up diagnosis of these diseases. That will lead to learning outcomes that will extend the exposure of the students to deep understanding of the content. These key concepts will be evaluated in each test, and continually reviewed in each class. In addition, I have designed a Team-based learning experience that will account for 30% of the grade in the class. Teams of four students will venture in creating a disease. Puzzling in and out key concepts of disease students will "build" their own chronic disease. Each team will design the disease as well as a treatment, and chart the outcomes of living with this disease. The design of the Team-based learning also creates an interrelationship between two teams. Team A will do the research for Team B and ensure they know the material sufficiently well to create or build the disease and write the report. This will result in greater accountability and peer instruction. This coming Fall 2018 I plan to engage SCOTS twice during the semester to use their feedback to maintain the quality of the class. Additionally I will keep records of the Team-based learning to make improvements and ensure its future quality. The syllabus can be found below.

Mentored Research

The research in our laboratory enlists undergraduate students that are required to take at least 2 credits of laboratory experience to graduate (PDBio major). Advanced classes of research are available for students who want to continue working in the lab. I have had students in both classes. Currently our laboratory has 15 undergraduates; ten of them have been in the advanced research track for at least 2 semesters. We are still enrolling new students. As I mentioned before, teaching is learning. I spened most of my time on campus learning from these students. As much as possible I schedule my time in the lab to coincide with the student's time in the lab. We often discuss experiments, protocol performance, new and interesting literature, etc. We have identified several ways in which we can connect our lab experience with service projects that help us look into the people we are trying to benefit with our efforts. This past April, two of my undergraduates attended a conference for the first time and presented a poster. We seek to repeat that experience for others that are also producing high quality work in the lab. Beyond this point, the work in our laboratory will produce 2-3 peer-reviewed publications with at least 1 undergraduate leading each publication. Most of the undergraduate authors are actively engaged in the writing of the manuscripts.

Future teaching

Our department is experiencing some renovations in the classes offered to undergraduate and graduate students. Several 500 and 600 levels classes will be updated, and a new formulation of content will be offered to students. Each faculty will

offer a 1-2 credit module based on their expertise. There are several contributions I plan to make to this new modality. I am preparing modules in Gastrointestinal physiology and pathophysiology; Proteins and protein engineering; and a third module on Mechanotransduction and Biophysics. Each module is a key component of the student's preparation to complete their college education and prepare them for future professional opportunities. The Gastrointestinal module will have a great impact on those seeking Healthcare professions. Protein and protein engineering, is a piece of the biological puzzle currently missing in our College. We have plenty of opportunities to study Genetics, but fail to help students learn in depth about the proteins encoded by the genes they have studied. This understanding is highly sought after by Biotechnological companies. In the past decade or so, Biotech companies have entered the Pharmaceutical companies market by producing peptides, hormones and antibodies. All these types of proteins have a great impact on health and treatment. Finally, Mechanotransduction, is a discipline that looks deep into the mechanical signals between cells and tissues. Recently, experts in the field have clearly expressed the lack of understanding of this process. They have stated that electrical and chemical signaling are much better understood and harnessed. This module will expose students to the current understanding of Mechanotransduction and also the ways in which we can design experiments to better understand it and harness it.

Scholarship goals:

My laboratory has taken two tracks for mentoring projects. The first is long-term goals in research and the second is short-term goals. The latter gears our teams for developing new techniques and technology to answer many of our long-term goals. The projects are assigned to undergraduate students' teams of 2 and up to 4 students. We have three teams getting ready to produce publications in the next 6 months of 2018.

1. Redesigned protein marker for both Western blot and size exclusion. D. Burreola,
   M. Castro, A. Uribe and D Name. **First author is an undergraduate from BYU, and Castro and Uribe are undergraduates from Chile that spent 12 weeks as interns early this year.**
2. New methodology to characterize Tight Junction strength using *E coli*. J. Rollins, T. Worthington, D. Name. **My coauthors are undergraduate students at BYU.**
3. Open SPR to understand protein-protein interactions in Tight Junctions. S. Djuric,
   B. Blackner, A. Steffensen, D. Name. **Blackner and Steffensen are BYU undergraduates.**

We seek to establish these new technologies through our publications but additionally be the firsts to use them and report about the positive aspects of them to further scientific understanding.

In the near future, the long-term goal teams will be producing publications based on work achieved by the short-term goal teams.

Funding is always a concern in which we place great effort. Last year I submitted a R15 grant proposal to the NIH. The grant was estimated to have had great importance while lacking merits on other areas. During 2018 I will resubmit the R15 NIH grant in October. Since the first submission, I have contacted the Program Officer at NIH and he has given me guidance to improve the application.

Our laboratory will seek funding from American Heart Association on a new project. The rules for application refer to theoretical ideas and experimental design that can yield high impact results. Our project is related to heart transplants and improving ischemic tissue in patients awaiting transplants. For this application in July 2018 I have 3 undergraduate students working on gathering evidence and discussing strategies for the research. The team members are co-authoring the grant application. Ryan Freeman, KB Jorgensen, Drew Brownwell are the undergraduate BYU students assigned to this project. One of my goals is to maintain external funding in order to supply students with a salary and research supplies.

Finally, I will utilize BYU resources (Office of Research Development) to identify funding opportunities directed towards undergraduate and graduate students. Among others, there are summer internships and research scholarships. In addition, the annual meetings we attend often supply funding opportunities to students for travel.

Citizenship goals:

In many ways my appointment to BYU is an invitation from Heavenly Father to further my career while helping His university's students succeed in finding theirs. I have discussed how my teaching and my research are student-based. Learning aspects of administrative tasks that benefit the Faculty community is a lofty goal for me. I have always been in the sidelines of a department life. Even as a Junior Faculty in a medical school I was not able to contribute due to my non-MD status. Here at BYU I have already received great opportunities to participate. In the Fall 2017 I was assigned to labor in the Research committee for PDBio, a 5-10 year commitment. I was also given the opportunity to be part of the review panel for MEGS (2 year commitment). I am also participating in the organization of a College-wide survey of the Undergraduate Mentored Experience. Our design seeks to understand the needs and motivations of undergraduates to seek these opportunities. The questions are designed also to identify areas in which the Undergraduate Mentored Experience can be improved as well as successfully offered to students beyond the credits needed for graduation.

Our Research committee has produced collaborative avenues for Faculty in our department that foster peer review of research as well as feedback for grant ideas.

The goal I will focus on is to administer the survey at the end of the Fall 2018 semester and prepare a report to be presented to the Dean of the Life Sciences College. Our design is a collaborative effort with other professionals to aid in the good preparation, administration and analysis of the results.

As a scholar I have been called upon the review process for journals and funding opportunities. My goal is to achieve greater recognition as a peer-reviewer in these avenues.

During the Winter semester I engaged in writing groups to improve my scholarly productivity. I will continue to participate in the writing groups fostered by BYU. In addition, I have created a blog in my lab webpage to attract the attention of other scholars in my field. We do research in a new research field and therefore it is pertinent to have discussions about new ideas, theories, etc. Our blog seeks also to discuss other scholar's work. We directly ask them for permission to do a brief blog entry on their work leading usually to brief introduction and sometimes to further collaborations. This new field, above mentioned, is called Barriology. It is intimately related to Mechanotransduction. With the help of the HBL library, we have started evaluating the pros and cons of creating the Journal of Barriology. This could be an online journal and could be managed by BYU students from many different departments.

Pathophysiology

PDBio 365, Section 1

Fall 2018

3:00 PM – 4:50 PM T Th

Dr. Name, Ph.D.


WELCOME

Instructor Information

Name: Name

Office Location: 3015 LSB

Office Phone: 801-422-0360

Office Hours: Monday through Friday 1:00pm-2:00pm or by appointment.

Email: Name@byu.edu

TAs

Brothers Matzoriley
Weft, Wight and Wong

TA Information
Name: xxxxx
Office Location: 3041 LSB
Office Hours (by appointment) Email:
xxx@gmail.com

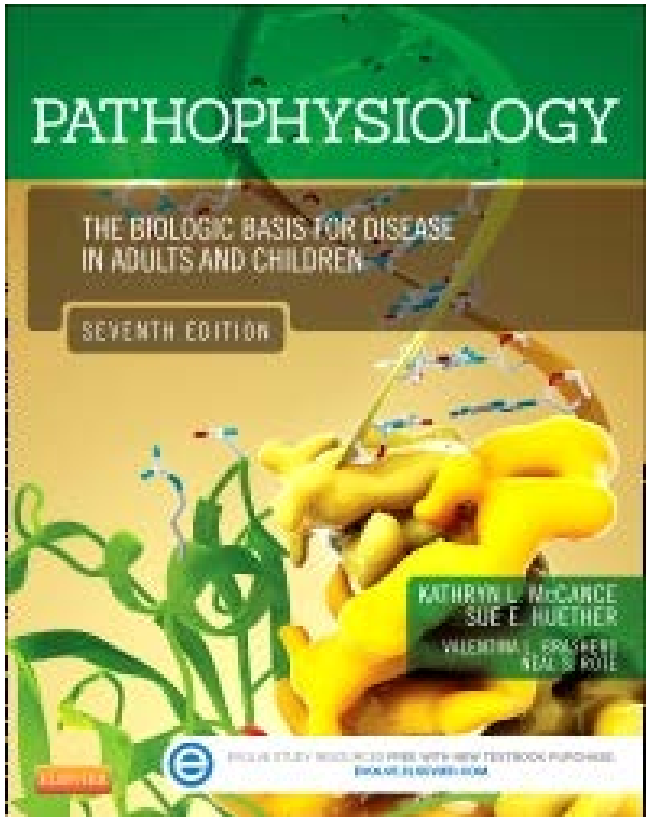
Textbook

Pathophysiology

<u>Any edition!!</u>

Authors: McCance & Huether

Publisher: Elsevier



<u>Pre-requisites</u>:

Physiology (PDBio 305 or 362)

Class purpose

To become more Christ-like by understanding all aspects of disease and its consequences to our bodies. Reflect on the effects of disease on the Body-Spirit relationship. Purposely focus your agency for service, the outwardly expression of charity.

Attitudinal Goals

- To obtain the knowledge and confidence to discuss personal health care issues with medical professionals.
- To develop a deeper appreciation and respect for the human body.
- To adopt/maintain a healthy lifestyle.

Learning Outcomes

Disease Prevention and Treatment

Students will exhibit an integrative understanding of the biochemistry, molecular biology, genetics, cell biology, microbiology, environmental biology, and physiology related to the prevention, development, and treatment of common diseases.

Learning Outcomes

Case Study Analysis

Students will analyze and evaluate case studies by applying criteria learned during the course of the semester of pathophysiological conditions. Students will follow clear logical steps and identify roadblocks in order to create a diagnosis.

Learning Outcomes

Effective Communication

Students will manifest a command of the physiology and pathophysiology vocabulary necessary to effectively communicate with other biomedical professionals, academics, and the general public.

Learning Outcomes

Pathophysiology and Ethics
Students will be able to articulate the ethical issues related to the treatment and prevention of pathophysiological conditions.

Learning Outcomes

Respect for Human Body

Students will manifest an increase in their respect for the human body and develop a plan to adopt a life style consistent with this respect.

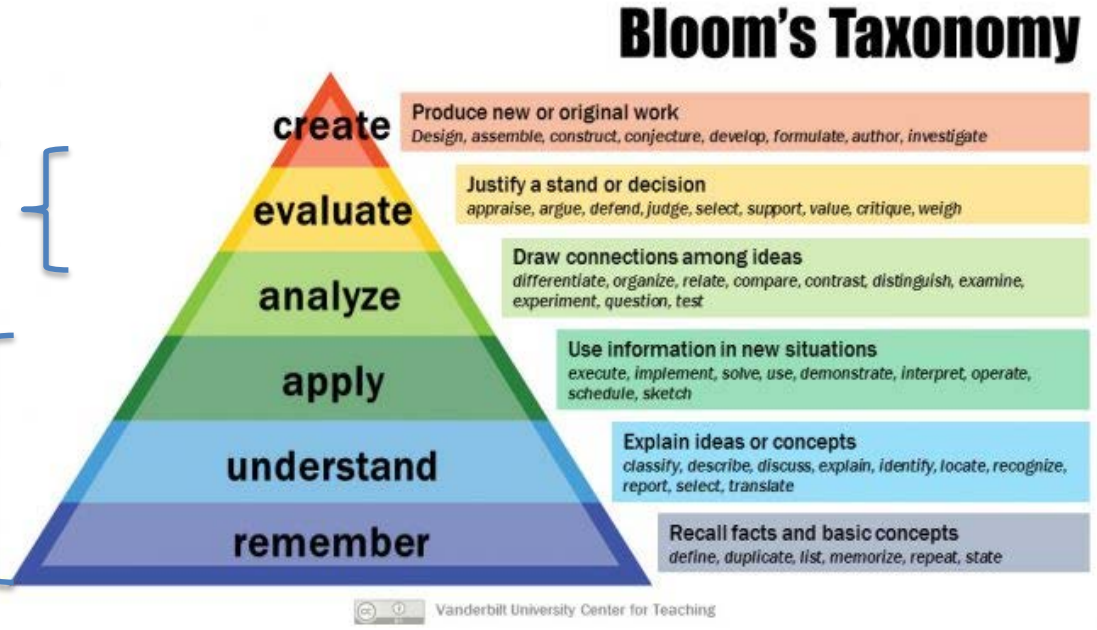
How do we learn Pathophysiology?

Create a disease

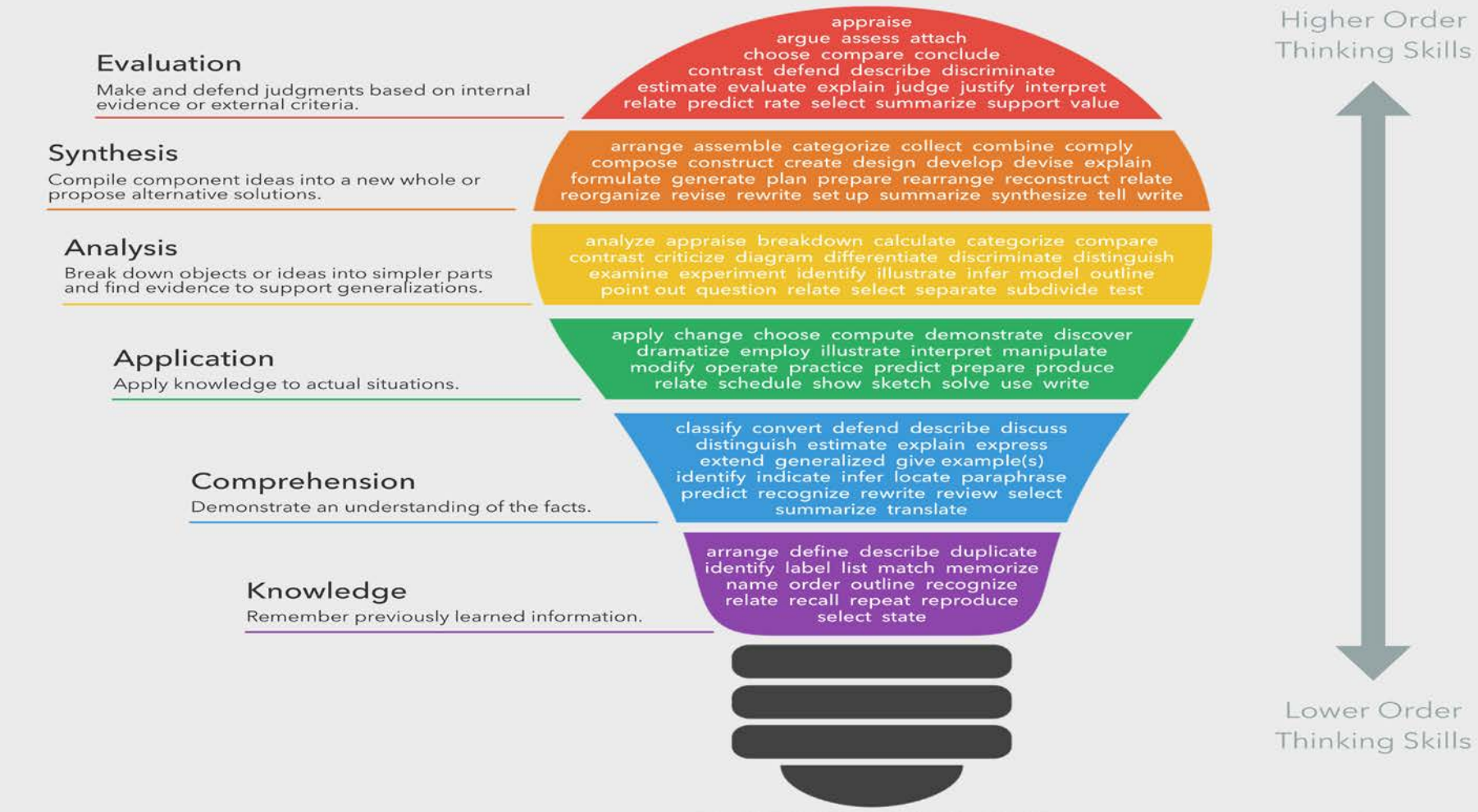
In-class clinical case

Case studies

Midterms



Bloom's Taxonomy Verbs



11 types of disease

1. ORGAN
2. PHYSICAL INJURY
3. ENVIRONMENT
4. INFECTIOUS
5. INHERITED
6. ENDOCRINE
7. BRAIN
8. BLOOD/IMMUNE
9. CANCER
10. PREGNANCY RELATED
11. MALNUTRITION

At first glance the universe of disease may seem distant and complex.
We can group disease in 11 types and learn from each group in order to have access to knowledge and understanding for other diseases.

We will focus our attention in disease of great relevance for the population of the US and of the world.

TOP 10 causes of death in the US

- Heart disease: 633,842
- Cancer: 595,930
- Chronic lower respiratory diseases: 155,041
- Accidents (unintentional injuries): 146,571
- Stroke (cerebrovascular diseases): 140,323
- Alzheimer's disease: 110,561
- Diabetes: 79,535
- Influenza and pneumonia: 57,062
- Nephritis, nephrotic syndrome, and nephrosis: 49,959
- Intentional self-harm (suicide): 44,193

TOP causes of death in the World

Of the 56.4 million deaths worldwide in 2015, more than half (54%) were due to the top 10 causes. Ischaemic heart disease and stroke are the world's biggest killers, accounting for a combined 15 million deaths in 2015. These diseases have remained the leading causes of death globally in the last 15 years.

Chronic obstructive pulmonary disease claimed 3.2 million lives in 2015, while lung cancer (along with trachea and bronchus cancers) caused 1.7 million deaths. Diabetes killed 1.6 million people in 2015, up from less than 1 million in 2000. Deaths due to dementias more than doubled between 2000 and 2015, making it the 7th leading cause of global deaths in 2015.

Lower respiratory infections remained the most deadly communicable disease, causing 3.2 million deaths worldwide in 2015. The death rate from diarrhoeal diseases almost halved between 2000 and 2015, but still caused 1.4 million deaths in 2015. Similarly, tuberculosis killed fewer people during the same period, but is still among the top 10 causes with a death toll of 1.4 million. HIV/AIDS is no longer among the world's top 10 causes of death, having killed 1.1 million people in 2015 compared with 1.5 million in 2000.

Road injuries killed 1.3 million people in 2015, about three-quarters (76%) of whom were men and boys.

Additionally, we will focus our attention in how we treat disease pharmacologically. This will allow basic understanding of treatments that are highly relevant to the population of the US.

DRUGS

10 most popular prescription drugs for 2017

1. Vicodin, Norco, Xodol (hydrocodone, acetaminophen)
2. Synthroid, Levoxyl, Unithroid (levothyroxine)
3. Delasone, Sterapred (prednisone)
4. Amoxil (amoxicillin)
5. Neurontin (gabapentin)
6. Prinivil, Zestril (lisinopril)
7. Lipitor (atorvastatin)
8. Glucophage (metformin)
9. Zofran (ondansetron)
10. Motrin (Ibuprofen)

- https://www.beckershospitalreview.com/supply-chain/10-most-popular-prescription-drugs-for-2017.html

Top 10 best seller prescription drugs for 2017

1. Humaira
2. Rituxan
3. Revlimid
4. Enbrel
5. Herceptin
6. Eliquis
7. Remicade
8. Avastin
9. Xarelto
10. Eylea

- https://www.genengnews.com/the-lists/the-top-15-best-selling-drugs-of-2017/77901068

Based on the previous criteria we have organized the following lectures:

ORGAN	PHYS.INJ.	INSULIN-R	
MAY 2 Heart MAY 3 Kidney	MAY 7 Phys. Injury (Human trafficking)	**MAY 8 Ins. Resistance** **MAY 9 Ins. Resistance II**	MID TERM #1
INFECTIOUS	**INHERITED**	**ENDOCRINE**	
MAY 16 Flu MAY 17 Tuberculosis	MAY 21 Cys Fibrosis MAY 22 Musc Dystrophy	MAY 23 PCOS MAY 24 Thyroid	MID TERM #2
BRAIN	**BLOOD/IMM**	**ENVIRON.**	
MAY 28 Stroke MAY 29 Alzheimer	MAY 30 Rheum Arthri MAY 31 Lupus	MAY 14 Diarrhea MAY 15 Goiter	MID TERM #3
CANCER	**PREGNANCY**	**MALNUTRITION**	
JUN 4 Skin JUN 5 Lung	JUN 6 Preeclampsia JUN 7 Spina Bifida	JUN 11 Famine JUN 12 Anemia	MID TERM #4

FINAL
December

In addition to the lectures there will be reading assignments resulting in a 1 page reflection. 10 points each.

ORGAN	PHYS.INJ.	INSULIN-R	
MAY 2 Heart MAY 3 Kidney	MAY 7 Phys. Injury (Human trafficking)	MAY 8 Ins. Resistan MAY 9 Ins. Resistance II 1	MID TERM #1
INFECTIOUS	INHERITED	ENDOCRINE	
MAY 16 Flu MAY 17 Tuberculosis	MAY 21 Cys Fibrosis MAY 22 Musc Dystrophy	MAY 23 PCOS MAY 24 Thyroid 2	MID TERM #2
BRAIN	BLOOD/IMM	ENVIRON.	
MAY 28 Stroke MAY 29 Alzheimer	MAY 30 Rheum Arthri MAY 31 Lupus	MAY 14 Diarrhea MAY 15 Goiter 3	MID TERM #3
CANCER	PREGNANCY	MALNUTRITION	
JUN 4 Skin JUN 5 Lung	JUN 6 Preeclampsia JUN 7 Spina Bifida	JUN 11 Famine JUN 12 Anemia 4	MID TERM #4

Writing Reflections

1. Medical Diagnosis and critical thinking
2. Medical Tourism
3. Faith and fear based behaviors in the clinical setting
4. Integrative Medicine: acupuncture and schizophrenia

Past the due date there will be no points granted.

Recurrent questions

- Changes in the body's physiology lead to pathophysiology. The most affected and at the same time predictive changes happen in certain organs giving rise to certain signs and symptoms that are characteristic of a given disease or condition. By evaluating these key principles of diagnosis we will be learning the body's adaptation and response to pathophysiological events.

Recurrent questions

Physiological

- Heart Physiology
- Lung Physiology
- Kidney Physiology
- Insulin resistance
- Cancer

*** For any given disease we will examine its impact on the most common and relevant physiological aspects of disease. These 5 indicators are responsible for the top 5 causes of death in the US.

Symptoms and signs

- Pain
- Heart sounds, blood pressure and ECG
- Lung sounds
- Fatigue (chronic and acute)
- Headache and fever
- CBC (blood count)

*** These 6 are the most common indicators of disease.

Midterm Exams (400 pts)

There will be **4 midterm exams** available in the testing center:

Exam 1: **Insulin-Genetics-Cancer (100 pts)**
Exam 2: **Neuro-Renal-Acid-Fluid (100 pts)**
Exam 3: **Hem-Immunity/Inflam-GI (100 pts)**
Exam 4: **Cardio-Pulmonary (100 pts)**

Any exams taken late (by prior arrangement) may be subject to a 5% penalty per day

You will have the opportunity to retake exams in class for ~15-20 minutes by group. At the end of the semester, you will pick one and receive the average between the two scores.

Case Studies (100 pts)

15 case studies throughout the semester

(scored by peers, the 5 lowest can be dropped)

Case studies are completed in **groups of 4**

- Groups will ideally consist of diverse majors

- You will have a few minutes during the break in class today to form groups

- **Your group leader will email TA-John your group**

Email TA-John by the end of the week!

Case Studies (10 pts each)

Late submissions will automatically lose all credit

In-class Case Studies (10 pts)

- Each group will prepare a case study that the class (in groups) will cover.
  - Each Tuesday at the beginning of class
  - Prepare a Powerpoint
  - 5 slides and 10 minutes
  - TA-John will create a schedule
  - TA-John will assign each group the clinical case
  - Prepare 3 questions to be given to the class following your presentation

Clinical Case study

GOAL:

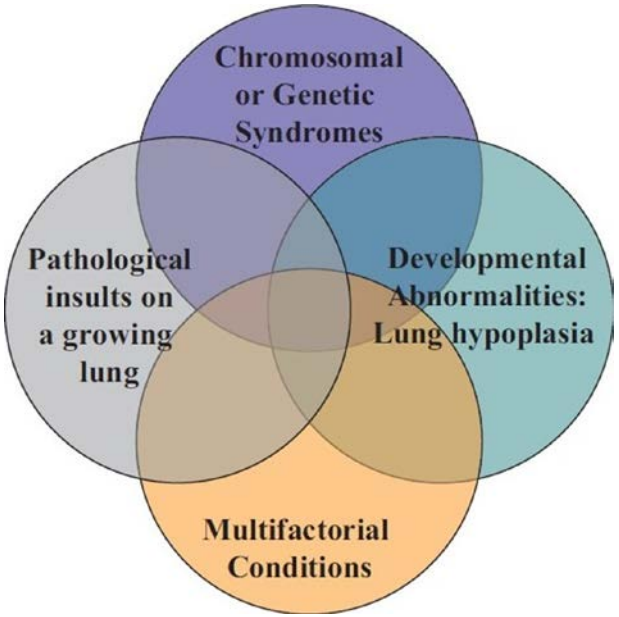
- Present a 50-year old clinical case to your classmates in a clear manner.
- Indicate etiology, demographics, US statistics for main diagnosis.
- You have to be knowledgeable of terms and details of the case.
- Explain the sound logic that led to the diagnosis and treatment.
- Examine “modern” treatments, medical and laboratory tests.
- Explain if TODAY, after 50 years of scientific progress, medicine has made an impact on a patient suffering from this illness.

Build-a-disease

Team-based learning

- Teams of 4 will be organized.
- Each team will be interrelated to another team throughout the semester
- Teams will be involved in the success of the partner team. For example, team A will research all areas needed to successfully complete the Build-a-disease assignment. Then peer-teach the partner team in order for production of the final report.
- Team members will receive evaluation from team members as well as partner-team

Build-a-disease



Chose:

1. Population
2. Patient's gender
3. Age (embryo, under 10, teen, 20-50, 50 and above
4. Type of disease from the 11 listed
5. Endocrine axis
6. Molecular events (e.g. receptor, signal cascade, genetics, etc.)

Build:

1. A chronic disease that has not been reported
2. Describe a treatment
3. Describe drug treatment
4. Suggest Integrative Medicine alternative
5. Describe medical "Dream Team" for management

Write a 5 page report.
RUBRIC

Implement Team Based Learning outcomes, checks and balances

Final Exam

There will be a comprehensive final exam worth **200 points**.

- Final will be in the same format as the midterm exams
- Will be available in the testing center during the entire finals week.

Will be a mix of old questions, new questions, and possibly student questions.

Grades:

Midterm Exams 400 pts

Case Studies 100 pts

Writing Assignments 40 pts

In-Class Case Study 10 pts

Build-a-disease 100 pts

Final (200 pts)

= **850** points

25% of the points arise from TBL

A	93% - 100%
A-	90% - 92%
B+	87% - 89%
B	83% - 86%
B-	80% - 82%
C+	77% - 79%
C	73% - 76%
C-	70% - 72%
D+	67% - 69%
D	63% - 66%
D-	60% - 62%
E	<60%

Breaks

- 5-min break at around ‘half-time’

Disclaimer

I love BYU
I love the honor code

Disclaimer

I am not a physician

Nothing I say is meant to be a prescription

Disclaimer

This class is demanding!

There is plenty of help with TA's office hours, Instructor's office hours!

Disclaimer

The data I share is intended to be viewed in the context of disease.

Devotional: Elder Dallin H. Oaks, Quorum of the Twelve Apostles

11:05 AM
Tuesday, 13 Sep, 2016

"Schools should foster free, open discourse. It is not their role to shield students from potentially offensive ideas."

Groups

- Take a few minutes and find classmates for your group
  - Mix your majors
  - Select a group leader
- The group leader needs to email **TA-John** (do it now!) the list of group member names
  - **called2serve1991@gmail.com**