

# The use of Pre-recorded Videos and Lab-lectures to Support Learning in the Laboratory

**BIOL 101 Labs**

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Imane Saleh

# End of August 2020:



- We all received this email...

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**Announcement Regarding the Teaching/Educational Process at Qatar University During Fall 2020 Semester | تعميم بشأن العملية التعليمية في 2020-08-24, 2:14 p.m.**  
**جامعة قطر للفصل الدراسي خريف 2020**

To FACULTY@LISTSERV.QU.EDU.QA ☆

**From: The Higher Committee for Health and Safety**

**To: All**

**Subject: Announcement Regarding the Teaching/Educational Process at Qatar University During Fall 2020 Semester**

As part of Qatar University efforts to carry out a smooth educational process during Fall 2020 semester, and in light of the current health situation in the country and worldwide and the State's plan regarding COVID-19, and as part of the preparations for fourth phase that is expected to start in 1 September 2020, Qatar University decided to commit to the following instructions regarding the teaching method during Fall 2020. These instructions will remain effective until further notice.

**Teaching Guidelines**

- Classes will continue according to the announced Fall 2020 calendar with no changes.
- All academic policies and procedures suspended during Spring 2020 are reactivated.
- Teaching will continue to be online except for students enrolled in some specific courses. Faculty members teaching these courses will communicate directly with their students to notify them that teaching will be on campus. These courses include:

# Our Challenge:

- Teach laboratory skills
- Keep students safe (social distancing)



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Reply All

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# Our Process:

- Convert labs to a “two shift” format
  - Each section = two groups
  - Each group attends a different time slot
- Analysis of our Syllabus
  - Labs introducing important skills or tools
  - Protocols adjusted to be completed in ~1hr

COURSE INFORMATION			
<b>Course Name:</b>	Biology I Laboratory	<b>Course Code:</b>	BIOL 101
<b>Semester:</b>	Spring 2021	<b>CRN Code:</b>	20038
<b>Department:</b>	Biological & Environmental Sciences	<b>Section:</b>	B51
<b>College:</b>	Arts & Sciences	<b>Core Curriculum:</b>	Major Requirement/Elective
<b>Day(s) and Time(s):</b>	Sun: 11:00 am -1:50 pm	<b>Credit Hours:</b>	0
<b>Classroom:</b>	C01-C115	<b>Prerequisites:</b>	Completion of the relevant English Language requirement

COURSE DESCRIPTION	
<p>The Biology 101 lab is the first introductory lab for biology majors and minors covering some important biological concepts, including biochemistry, cell structure and function, photosynthesis, cellular respiration, cellular reproduction, and genetics. The laboratory introduces basic laboratory skills such as safety, microscopic procedure, measurement, and reinforces concepts discussed in lecture. There are three hours of lecture and three hours of laboratory per week. In the laboratory part the laboratory manual “<i>Investigating Biology</i>” by Morgan and Carter will be used, emphasizing how we can apply biological knowledge to our own lives and to our relationship to other organisms. As activities, simple experiments will be carried out during the lab time; a quiz will be also performed on the topic and experiments of the same lab, lab reports should be prepared on a weekly basis.</p>	

FACULTY INFORMATION	
<b>Instructor:</b>	Iman Saleh TA
<b>Office Location:</b>	Female campus, Room: C220
<b>Office Hours:</b>	Monday: 8-9am (online) Wednesday: 8-9am (online) <a href="https://eu.bbcollab.com/guest/td25fd35c67b45e487372a30a03f156a">https://eu.bbcollab.com/guest/td25fd35c67b45e487372a30a03f156a</a> Send an email for an appointment at any time
<b>Telephone:</b>	4574
<b>E-Mail:</b>	<a href="mailto:imanesaleh@qu.edu.qa">imanesaleh@qu.edu.qa</a>

REFERENCES AND LEARNING RESOURCES	
<b>Required Textbook:</b>	Morgan and Carter, <i>Investigating Biology Laboratory Manual</i> , 7 <sup>th</sup> Edition. Pearson, 2011. ISBN: 9780321668219
Uploaded laboratory protocols and lab reports	

COURSE REGULATIONS	
<ul style="list-style-type: none"><li>• Read about the experiment from the lab manual and the lab protocol before joining to the actual session and prepare and watch any pre-lab material posted for you.</li><li>• Arrive to the lab or join the lab session on time, students late for more than 5 minutes will not be allowed to attend.</li><li>• Please try not to miss any practical session as it would be very hard for you to catch up.</li><li>• If you are absent, you are responsible for everything covered during your absence.</li><li>• Your health and safety are of utmost concern, you should follow the safety recommendations at all time. Students who fail to follow safety rules will not be allowed to attend the lab (safety rules are uploaded on black board).</li><li>• Electronics including mobiles are not allowed in the lab.</li><li>• You are not allowed to bring any food or drinks to the lab.</li><li>• You should fill all the results in their appropriate spaces in the lab protocol, this will help you to complete the lab report later. If your data is different from others, consult your instructor to see if you should repeat the experiment.</li></ul>	

# Our Solution:



- “Hybrid Flipped Classroom”

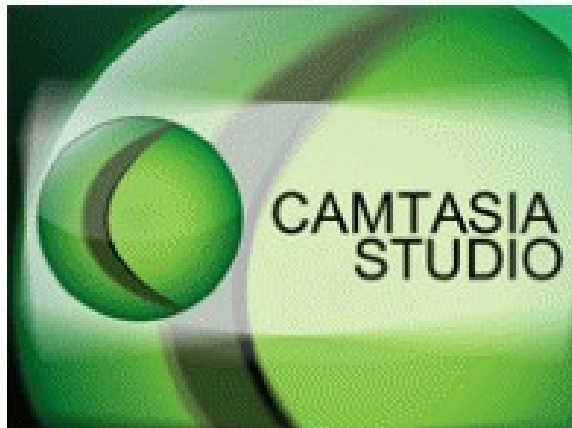
- ~ “Flipped”:

- Background material was covered by students on their own before class
- Class time was used for application of knowledge and discussion of any difficulties/confusion

- ~ “Hybrid”:

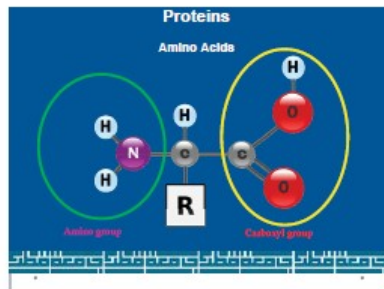
- Part of the content delivered online
- Part of the content delivered in class
  - ~ Focus on physical skills and new tools

# Pre-Lab Lectures



echo<sup>360</sup>  
active learning

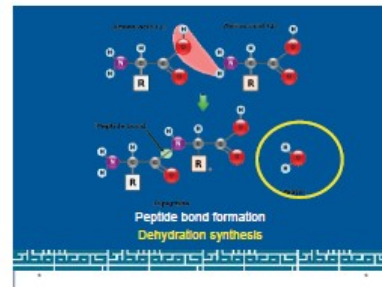
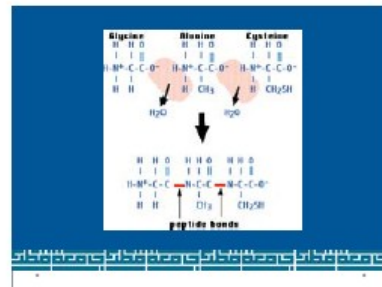
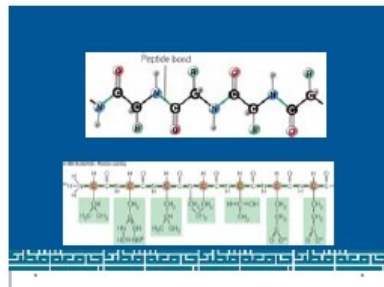
# Pre-Lab Lectures



- ### Organic compounds
- Living things (C-H)
  - Proteins
  - Carbohydrates
  - Lipids
  - Nucleic acids

- ### OBJECTIVES
- Testing for carbohydrates:
    - Benedict's test
    - Molisch Test
    - Iodine test
  - Testing for proteins:
    - Biuret test
  - Testing for lipids:
    - Emulsification test
    - Sudan III test
  - Identifying an unknown solution

### Chemical Composition of Cells



- ### Testing for Carbohydrates
- Carbohydrates
    - In several different forms
    - Monomers (Glucose, Fructose, Galactose)
    - Dimers (Sucrose, Lactose, Maltose)
    - Polymers (Glycogen, Cellulose, Starch)
  - Can be identified using several different tests
    - Molish test
    - Iodine test
    - Benedict's test

### Proteins Functions

The violet color is darker if solution is more concentrated with peptide bonds.

- ### Biuret test
- The reagent used in the Biuret Test is a solution of copper sulfate (CuSO<sub>4</sub>) and sodium hydroxide (NaOH).
  - The NaOH is there to raise the pH of the solution to alkaline levels; the crucial component is the copper II ion (Cu<sup>2+</sup>) from the CuSO<sub>4</sub>.
- 
- When peptide bonds are present in this alkaline solution, the Cu<sup>2+</sup> ions will form a coordination complex with 4 nitrogen atoms from peptide bonds.
  - The complex of Cu<sup>2+</sup> ions and nitrogen atoms make the color of CuSO<sub>4</sub> solution changes from blue to violet.

# Practical Videos



- Demonstrate the procedure
  - Helps students to **visualize** what they will do
    - ~ Provide clear view of the tool being used
    - ~ Students can re-watch parts of the video
  - Allows students to follow along
    - ~ Students are able to use it as a guide in class
- Provide explanations during the demo
  - Helps students understand protocol
    - ~ Direct interaction with TA in class is less necessary
  - All sections receive the same content
    - ~ Variability between TA explanations is minimized



# Practical Videos

- Procedure is demonstrated along with an audio commentary
- Procedure is shown and relevant step is highlighted

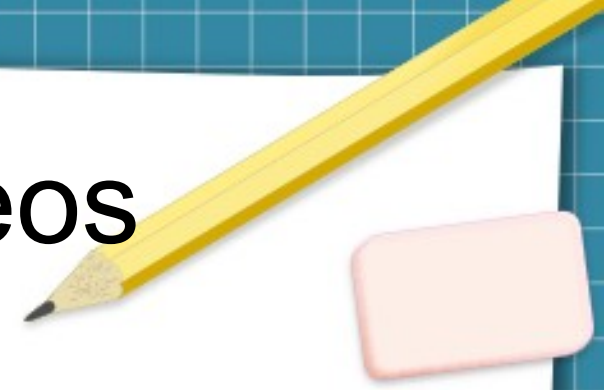


## Osmotic Behavior in Cells with a Cell Wall.

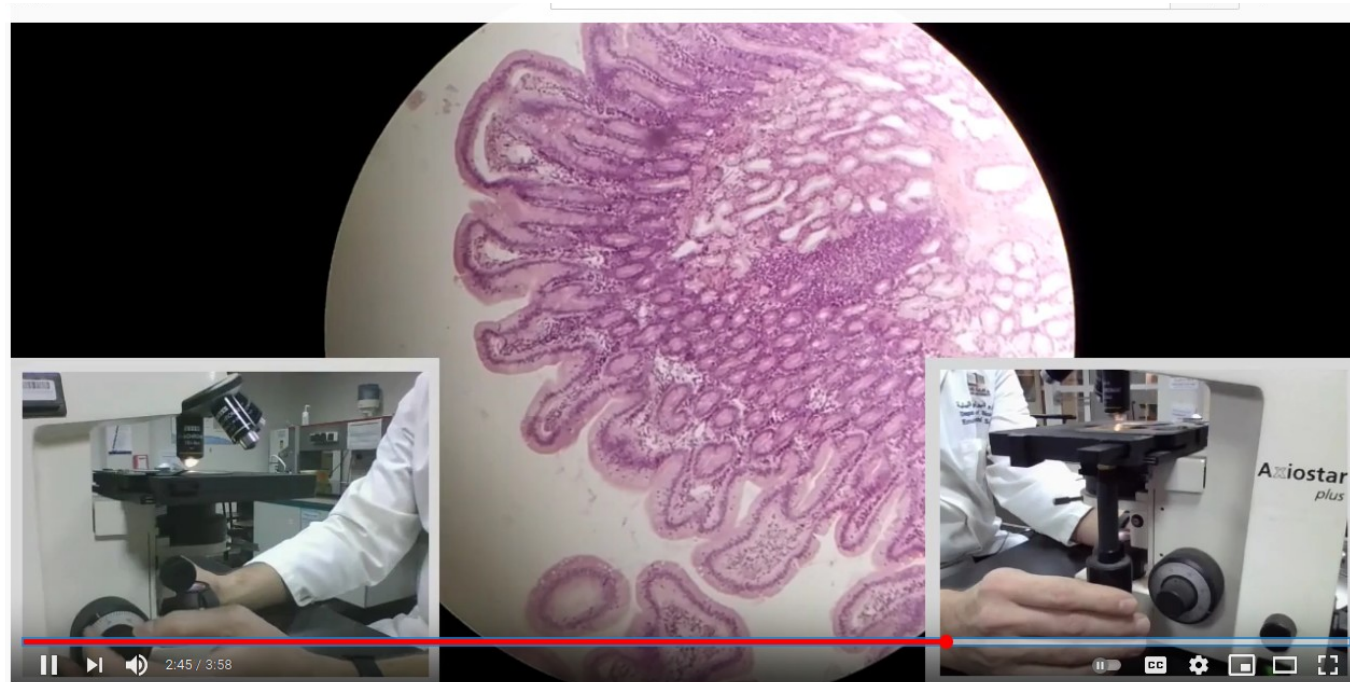
Already Completed

1. Obtain seven small bottles or disposable cups, label them, and fill them as follows:
  - a) 100ml of Deionized water (DI water)
  - b) 100ml of 0.1M sucrose
  - c) 100ml of 0.2M sucrose
  - d) 100ml of 0.3M sucrose
  - e) 100ml of 0.4M sucrose
  - f) 100ml of 0.5M sucrose
  - g) 100ml of 0.6M sucrose
2. Use sharp cork borer to obtain 7 cylinders of potato.
3. Line up the potato cylinders and use a blade to cut all cylinders to uniform length of about 5 cm.
4. Remove the peels from the ends.
5. Weigh the potato cylinder and record the weight in table 4.
6. Place it into the container with DI Water.
  - Note the time at which you have placed the potato in water
7. Repeat steps from 5 and 6 for each potato cylinder but place each in one of the remaining solutions from 0.1 to 0.6M.
8. Incubate 1.5 – 2hrs.

# Equipment Use Videos



- Usage is demonstrated along with an audio commentary
- An effort is made to show multiple views



# Classtime



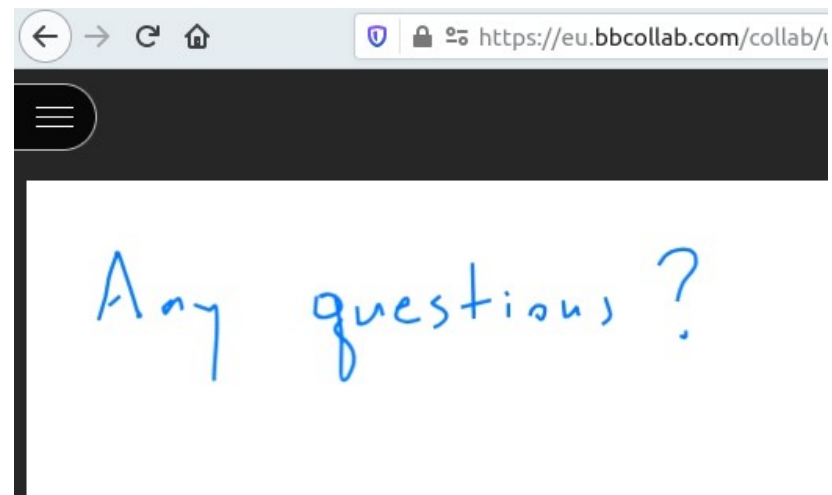
- On Campus Labs:

- ~ Students started working immediately

- Improved student preparation & understanding
- More confidence and independence

- Online Labs:

- ~ Time was used to clarify any confusion and challenge student understanding

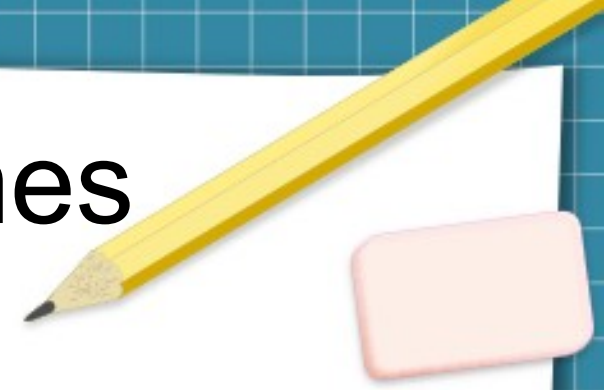


# Follow up on Students' Commitment to the Pre-recorded Material

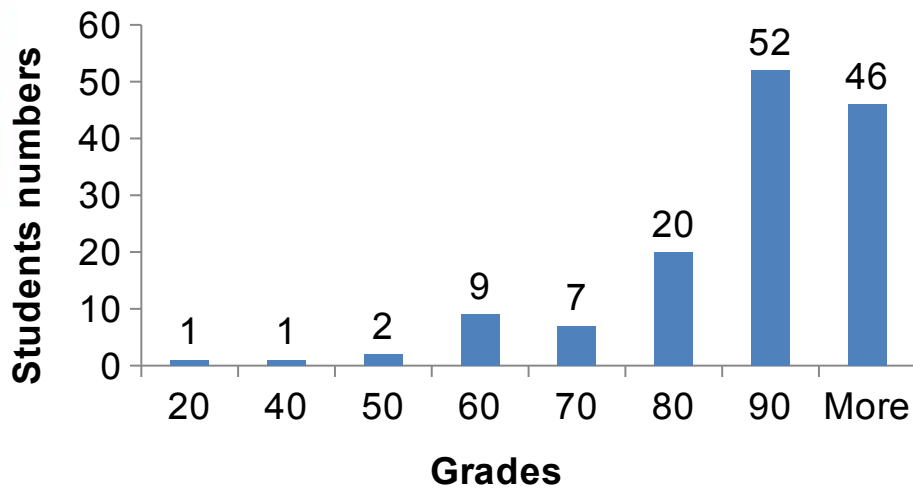


- Quick discussion questions
- Weekly quizzes

# Testing the Outcomes

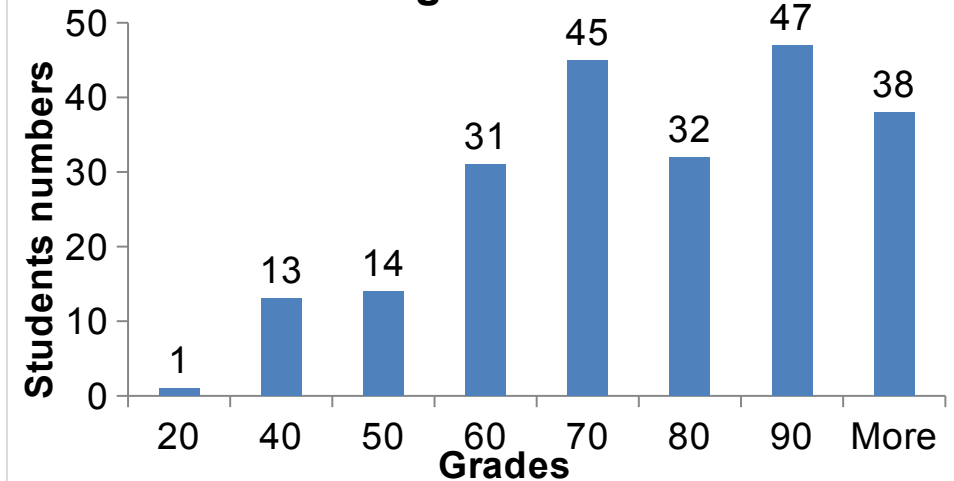


Mid-term grades Spring 2021



- Average=83.7%

Mid-term grades Fall 2018



- Average=71.6%



# Some Relevant Literature:



## Use of Visualization to Support Learning/Performance:

LeVan, A. (2009). Seeing Is Believing: The Power of Visualization.  
<https://www.psychologytoday.com/blog/flourish/200912/seeing-is-believing-the-power-visualization>

Munroe-Chandler, K., & Guerrero, M. (2017). Psychological Imagery in Sport and Performance. In Oxford Research Encyclopedia of Psychology.  
<http://psychology.oxfordre.com/view/10.1093/acrefore/9780190236557.001.0001/acrefore-9780190236557-e-228>

## Use of Videos to Support Learning:

Guo, P. J., Kim, J., and Rubin. R. (2014). How video production affects student engagement: an empirical study of MOOC videos. In Proceedings of the first ACM conference on Learning @ scale conference (L@S '14). ACM, 41-50.  
<http://up.csail.mit.edu/other-pubs/las2014-pguo-engagement.pdf>

Mayer, R. (2014). Research-based principles for multimedia learning [Video]. Presentation, Harvard University.  
<https://youtu.be/AJ3wSf-ccXo>

Muller, D. (2013). The Secret to Engagement: Lessons from Video [Video]. Perimeter Public Lectures.  
<http://www.perimeterinstitute.ca/videos/secret-engagement-lessons-video>

