

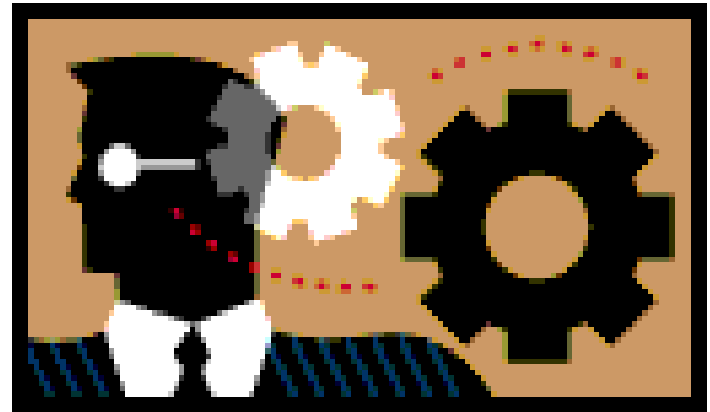
TEACHING STUDENTS WITH
HETEROGENEOUS BACKGROUNDS:
Challenges and Strategies

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About my course.....



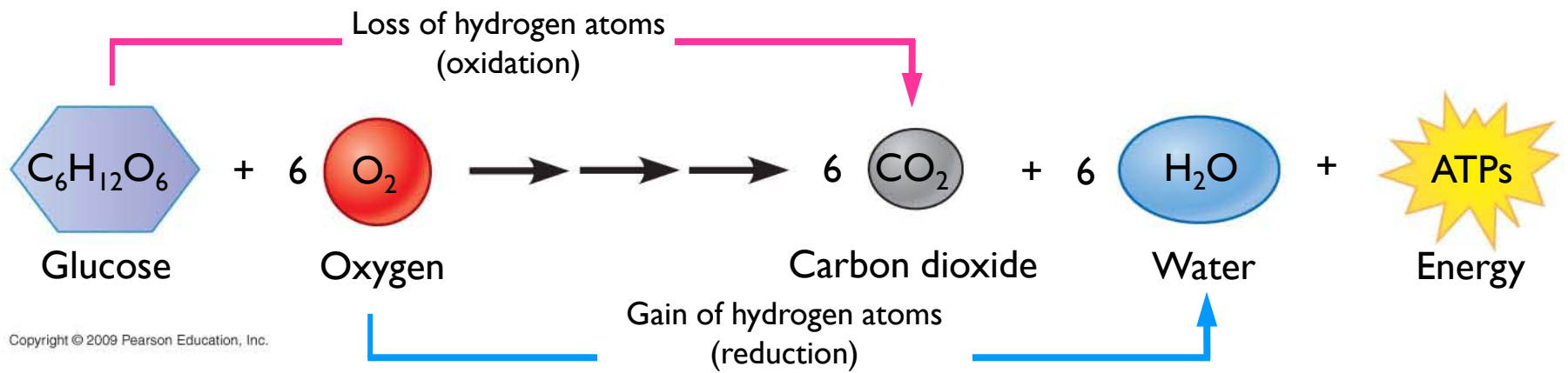
- ▶ A course about *Biochemistry* and *Biotechnology* (3 Units)
- ▶ Originally designed for first year *Pharmacy students*
 - ▶ JUPAS, non-JUPAS, Early Admission Scheme
- ▶ *Biology background* is an advantage?
- ▶ In 2010-11, also offered to *Biomedical Engineering students*

Pharmacy vs. *Biomedical Engineering*

30 students

50 students





Source: Campbell et al. Biology: concepts and connections (Instructor Manual). Chapter 6. Pearson Education Inc.

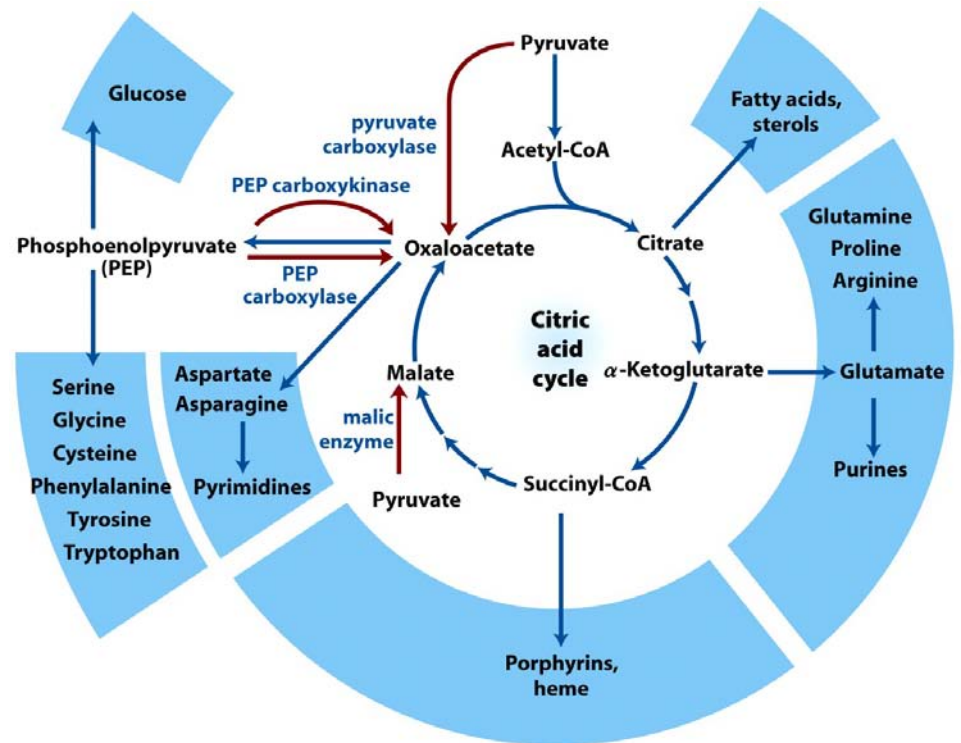
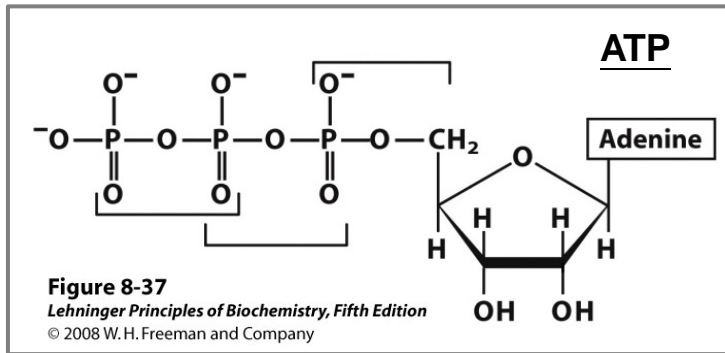


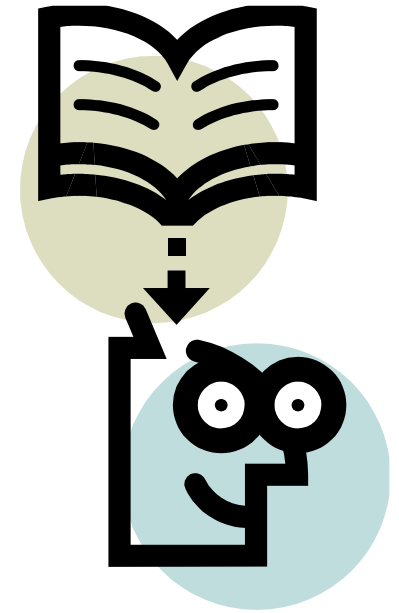
Figure 16-15
Lehninger Principles of Biochemistry, Fifth Edition
© 2008 W.H. Freeman and Company

▶ **Components of the course:**

- ▶ Didactic lectures
- ▶ Tutorials (case-based, ~12 students/ group)
- ▶ Laboratory sessions (3-4 students/ group)
- ▶ Project presentation (3-4 students/ group)

▶ **Assessments:**

- | | |
|----------------------------------|-----|
| ▶ Mid-term examination (written) | 25% |
| ▶ Final examination (written) | 45% |
| ▶ Project presentation | 10% |
| ▶ Lab reports | 10% |
| ▶ Lab quiz | 10% |



- ▶ All *teaching components* for the 2 groups of students are the same
- ▶ The *assessments* (mode of assessments and question papers) are the same
- ▶ *New topics* introduced to *Project Presentation* for Biomedical Engineering students



Questions to myself.....

- ▶ Students with *heterogeneous backgrounds* – they are coming from 2 totally different programmes !!!
- ▶ Very *intensive* content and other learning activities
- ▶ ALL lectures started at **8:30 am**..... -.-
- ▶ Will the students *lose interest* in a few weeks/ find the course *too difficult* ?
- ▶ *Assessments* appropriate to both groups of students?

1) How to make the course more interesting?

2) How to enhance interactions between the two groups of students?

Learning Objectives

- ▶ Distinguish *fat-soluble* and *water-soluble* vitamins
- ▶ Recall the *format* of water-soluble vitamins as *coenzymes* in *metabolisms*
- ▶ Describe the *problems* associated with *deficiencies* of *water-soluble vitamins*



Vitamins ?

Fruits (<http://www.marcoborges.com/blog/wp-content/uploads/2009/10/naturalVitamins.jpg>)

Vitamin tablets (http://www.cosmosmagazine.com/files/imagecache/news/files/20070301_vitamin.jpg)

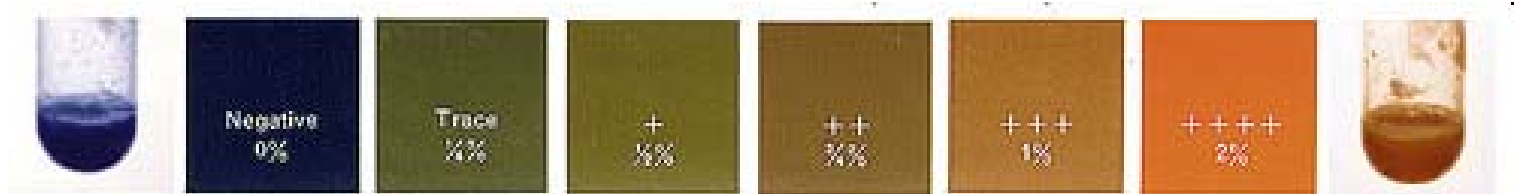
Vitamin drinks - leaflet of vitaminwater by Energy Brand Inc.

Laboratory Sessions

Multistix test →



Clintest tablet test ↓



Urine analysis

(students conducted tests with their own urine samples)

4+ positive for glucose in urine sample

Project Presentation

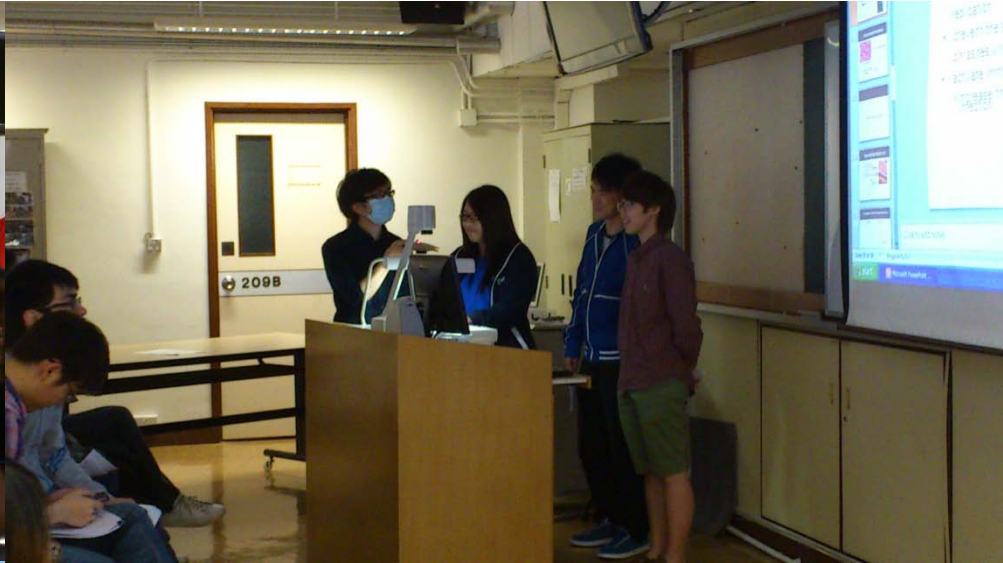
Venue: Room 207

No.	Topic
1	A2: Can organ transplant be replaced by therapeutic cloning?
2	B10: Mini medical devices and the market potential.
3	B13: Recombinant proteins and our daily lives: are we mastering science or being mastered by science?

Venue: Room 211

No.	Topic
1	B11: Recent advances in artificial limbs.
2	B4: Brain-computer interface: will brain-controlled avatar become our second life?
3	A10: What are the obstacles of anti-cancer drug development?





A bit difficult for
students without
biology background

>.<

The lab sessions are
interesting! XD

I have no idea what
will be asked in the
examinations..... :-

The terminologies are
quite difficult (especially
at the beginning of the
course) T.T

Better to have tutors
available for after-class
discussions ^.^



First year's experience.....

- ▶ Students *like* the course in general
- ▶ Students who do not have prior biology training found the *terminologies* and *concepts* difficult at the beginning of the course
- ▶ *Face-to-face after class discussions* are preferred by Biomedical Engineering students, while Pharmacy students preferred the case-based tutorials
- ▶ A balance between course *level* and *delivery approaches* vs. the *strength* and *weakness* of the 2 groups of students
- ▶ Avoid examination questions that may sound *more favorable* (from the view of the students) to the other group of students
- ▶ Some *online exercises* may help to increase the confidence of students to handle the examination

Academic year 2011-12 (2nd launch)

- ▶ Modified learning activities for 2 groups of students

Pharmacy	Biomedical Engineering
Lectures, project presentation	
Case-based tutorials (small group)	Revision tutorials (big class)
Lab sessions x 5	Lab sessions x 3
Lab quiz (4 topics)	Lab quiz (3 topics)
Different examination papers for 2 group of students (mid-term exam, final exam)	



Course Tools

- Course Content
- Syllabus
- Announcements
- Assessments
- Mail
- Search
- Calendar

(H) = Hidden

Instructor Tools

- Manage Course
- Assessment Manager
- Grade Book
- Grading Forms
- Group Manager
- Tracking
- Selective Release

Your location: [Assessments](#) > [Revision 1 - TCA Cycle and Oxidative Phosphorylation](#) > **Assessment Manager**

Assessment Manager

Graded Not Graded Not Submitted All View by: Revision 1 - TCA Cycle and Oxidative Phosphorylation









Attempts that have been graded.

Revision 1 - TCA Cycle and Oxidative Phosphorylation 241 Graded

The grade displayed is the Highest of the Student's attempts.

Name	Grade Out of 20	Attempt	Score Out of 20	Time
Kin On AO	13	1. February 23, 2012 1:14 PM	13	39:05:07
Lai Kei CHAN	18	1. February 21, 2012 1:29 PM	18	00:28:39
Ho Yan CHAN	20	1. February 22, 2012 1:20 PM	11	00:14:11
		2. February 22, 2012 10:24 PM	20	00:06:37
Tsz Fung CHAN	18	1. February 22, 2012 8:19 PM	17	00:25:13
		2. February 22, 2012 8:29 PM	18	00:03:07
Sik Yuen CHAN	19	1. February 22, 2012 9:25 PM	15	00:10:21
		2. February 23, 2012 12:49 AM	17	00:07:58
		3. February 23, 2012 12:54 AM	19	00:03:29
		4. February 23, 2012 12:57 AM	19	00:01:51
		5. February 23, 2012 12:59 AM	19	00:01:33
Po Yue Bonnie CHAN	13	1. February 23, 2012 2:35 AM	13	00:25:55

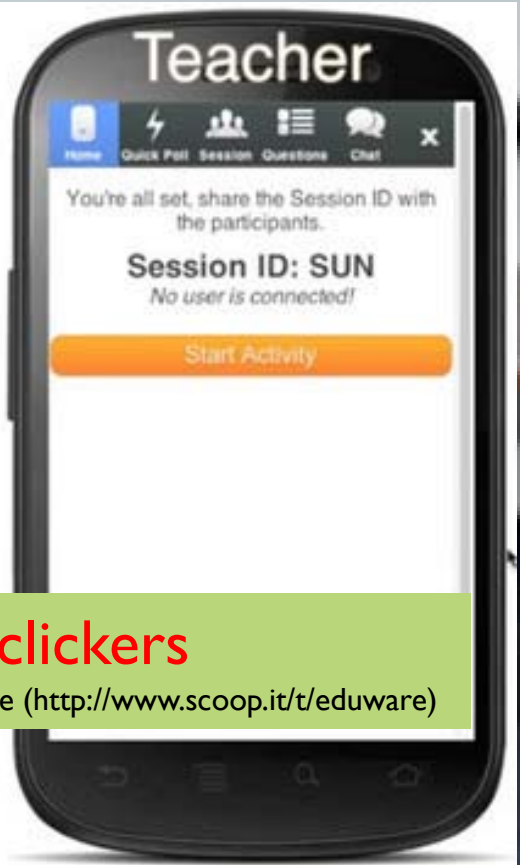
Course Content Map  

-  **Course Tools**
-  Course Content
-  Syllabus
-  Announcements
-  **Assessments**
-  Mail
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-  **Instructor Tools**
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<input type="checkbox"/> Man Lok HUI 	4	1. April 5, 2012 10:05 AM 	4	00:04:25
<input type="checkbox"/> Ming Wai KWAN 	6	1. April 4, 2012 9:55 PM 	6	00:01:39
<input type="checkbox"/> Chui Mei LAM 	5	1. April 5, 2012 1:20 PM 	5	00:01:55
<input type="checkbox"/> Ka Ho LAU 	5	1. April 5, 2012 12:15 AM 	5	00:01:50
<input type="checkbox"/> Cheuk Lam LAU 	5	1. April 1, 2012 1:31 PM 	5	00:05:06
		2. April 4, 2012 11:24 PM 	5	00:01:26
<input type="checkbox"/> Tsz Ho LAU 	6	1. March 30, 2012 4:59 AM 	3	00:08:41
		2. April 5, 2012 11:40 AM 	4	00:01:45
		3. April 5, 2012 11:41 AM 	5	00:00:42
		4. April 5, 2012 11:43 AM 	5	00:01:17
		5. April 5, 2012 11:44 AM 	6	00:00:20
<input type="checkbox"/> Hong Yung Arthur LEE 	6	1. April 4, 2012 6:57 PM 	6	00:01:38
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<input type="checkbox"/> Ken Long LEE 	5	1. April 4, 2012 5:08 PM 	5	00:02:44
<input type="checkbox"/> Chun Wai LEUNG 	6	1. April 5, 2012 10:38 AM 	3	00:02:32
		2. April 5, 2012 10:39 AM 	4	00:00:43
		3. April 5, 2012 10:40 AM 	5	00:00:22
		4. April 5, 2012 10:44 AM 	5	00:00:17
		5. April 5, 2012 10:49 AM 	6	00:00:17
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<input type="checkbox"/> Wing Man LI 	6	1. March 31, 2012 11:45 PM 	4	00:03:36
		2. March 31, 2012 11:47 PM 	4	00:00:52
		3. April 4, 2012 5:18 PM 	3	00:05:34



Mobile clickers
Figure from **Scoop.it** by Eduware (<http://www.scoop.it/t/edware>)



What are the views of students on this course?

Kaman Chan (Biomedical Engineering 1)

Matthew Hui (Pharmacy 1)



ATP and Energy Storage

BiologyInMotion.com

Copyright 2002 Leif Saul

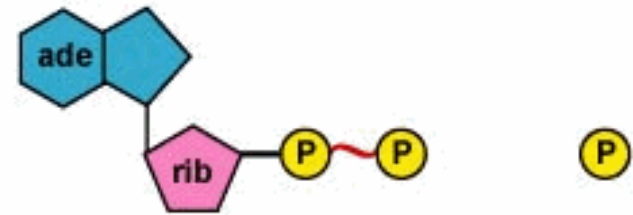
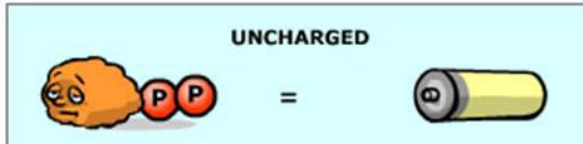
1 ATP stores energy

Living things store energy mainly in the form of chemical bonds. Within your cells, energy is constantly moved around from one large molecule to another. How does the energy get converted from, say, a food molecule to a muscle molecule? The answer is adenosine triphosphate, or ATP.

ATP works like a rechargeable battery. Energy can be released by converting ATP to ADP, which is the "uncharged" form. Likewise, by binding to a third phosphate group, ADP can be converted back to ATP, the "charged" form.

When you eat lunch, many complex chemical reactions occur. But in essence all you are doing is "recharging" your ATP, because in order to do anything--flexing muscles, thinking, or whatever--your immediate source of energy is ATP.

ATP, YOUR "RECHARGEABLE BATTERY"



Animation by Gary E. Kaiser from website <http://faculty.cbcemd.edu/biotutorials/energy/atpan.html>

Animation and content from Biology in Motion

(<http://www.biologyinmotion.com/atp/index.html>)

Anaerobic respiration

Adenosine triphosphate (ATP) / diphosphate (ADP) / monophosphate (AMP)

Animated glossary

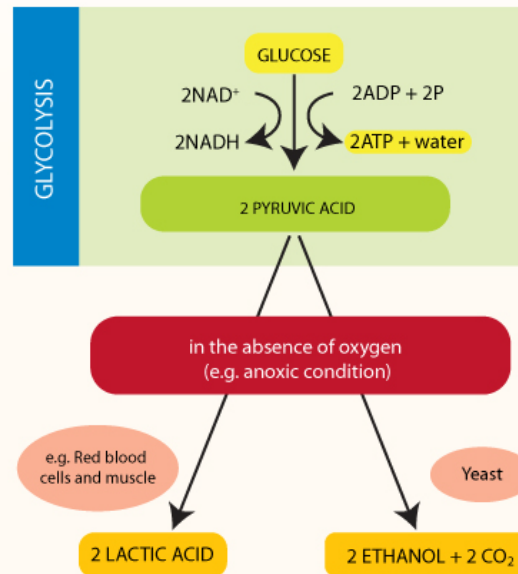
Anaerobic respiration

Respiration:

A process in cells that involves the oxidative breakdown of fuel molecules (e.g. glucose) for the generation of energy (ATP).

Anaerobic: In the absence of oxygen.

Anaerobic respiration refers to a special type of respiration in the cells in the absence of oxygen. Examples of cells that undergo anaerobic respiration include muscle cells during vigorous exercise, and yeast cells during fermentation.



Source: [http://leavingbio.net/RESPIRATION-\(higher%20level\).htm](http://leavingbio.net/RESPIRATION-(higher%20level).htm)

The table below summarizes the differences between aerobic and anaerobic respirations:

Aerobic Respiration	Anaerobic Respiration
Occurs in the presence of oxygen	Occurs in the absence of oxygen
Pyruvate is converted to lactate (muscle cells) or alcohol (yeast cells)	Pyruvate is converted to acetyl CoA
Reactions occur in the cytoplasm (glycolysis) and mitochondria (TCA cycle and oxidative phosphorylation)	All reactions occur in the cytoplasm
Relatively small amount of energy is produced	

~ Thank You ~