





# **PeerWise Participation**

# Supporting students in a multiple choice environment

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# **Biology 112: Unicellular Life**

# The principles of cellular and molecular biology using mainly bacterial examples.

### **Course topics:**

- Bacterial cell structure and function
- Genetics
- Metabolism

### **Enrolment:**

- 6 lecture sections of 280 students (3 per term).
- Two terms of 800 students per term.



# **Biology 112: Unicellular Life**

### **Course Structure**

Grading:

- Exams = 80% of the grade [2 midterms,1 final exam]
- Participation marks = 20% of the grade.
- Exams consist of multiple choice questions.

### Participation marks :

Pre-class reading assignments quizzesOnlineGroup writing activities [Inventions & Investigations]In class"Thinking questions" by i≻clickerIn classPeerWise website-student authored questionsOnline



# What is PeerWise?

### "PeerWise supports students in the creation, sharing, evaluation and discussion of assessment questions."

- Create, answer and comment on multiple choice questions.
- Creates a database of questions for the course.
- Learn by answering other questions and providing feedback.
- Freely available through University of Auckland, New Zealand
- Easy set up, accessibility for instructors and students.

### http://peerwise.cs.auckland.ac.nz/ Contact: Paul Denny , Dept of Computer Sciences



# Why Use PeerWise?

### **For Students**

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- Writing & evaluating questions promotes deep, reflective thinking.
- Actively contributing to their learning outside class.
- Easily accessible.

### **For Instructors**

- Facilitates learning activities for large number of students.
- Minimal set up and administration.
- Easy data collection & marking for participation.
- Great ideas for exams questions.



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# How did we use PeerWise in 2010 - 2011?

Prior to an exam, students had to:

- Create 1 multiple choice question.
- Answer and provide feedback on 2 multiple choice questions created by other students.
- Repeated 3 times in a term for each exam.

Grading:

- = 3% of their total grade:
  - •For each exam = 0.5% for creating 1 question, 0.5% for answering 2 questions.

•No extra points for creating or answering more questions.

# Writing Questions

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# **Question Topics**

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# **Answering Questions**

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49*       Wen glucose is reithroduced tilo a system which is operating on       13gm, 07 De       60       image: 0       14sgm, 12 De       7       medlum / had       2.00         50*       Wehn glucose is reithroduced tilo a system which is operating on       13gm, 07 De       61       image: 0       84gm, 12 De       3       essy / medlum       1.87         50*       Wehn glucose is reithroduced tilo a system which is operating on       13gm, 07 De       1       image: 0       84gm, 12 De       3       essy / medlum       1.87         51:50:1       15:20       12:23       12:440       14:440		48 »	Why is the annealing of the oligonucleotide primer performed at	8:05pm, 08 Dec	47	VES.	0	9:45pm, 11 Dec	4	easy	2.90		
44 m       When glucose is retrividuced into a system which is operating on       136pm, 07 Dec       60       Cold       Cold<									-				
90 m       Which are characteristics of a plasmit? 1. DNA Molecule between       11 stam, 07 Dec       51       100       8 depr, 12 Dec       3       easy / medium       1.67		49 »	When glucose is reintroduced into a system which is operating on	1:36pm, 07 Dec	60	V 1455	0	1:45pm, 12 Dec	/	medium / hard	2.00		
		50 »	Which are characteristics of a plasmid? 1. DNA Molecule between	11:41am, 07 Dec	51	28 NO	0	8:46pm, 12 Dec	3	easy / medium	1.67		
331:30       331:30       371:30       381:30       971:30       81:30       971:30		<< Prev   1-10	11-20   21-30   31-40   41-50   51-60   61-70   71-80   81-90	91-100   101-110	111-120	121-130	131-140   1	41-150   151-160	<u>161-170   1</u>	71-180   181-190   19	1-200 20	11-210   211-220   221-230   231-240   241-250   251-260   261-270   271-280   281-290   291-300   301-310   311-320   321-330   331-340   341-350	
1031       1041-1000		691-700 701-	370         371-360         361-390         391-400         401-410         411-420         421-430           710         711-720         721-730         731-740         741-750         751-760         761-770	771-780 781-79	0 791-800	801-810	811-820	821-830 831-840	841-850	851-860   861-870   8	71-880 8	41:320         331:300         361:370         371:300         361:370         371:300         361:370         371:300         361:370         371:300         101:020         021:030         031:040         041:030         031:040         041:030         031:040         101:020         101:020         101:020         101:020         101:020         101:020         101:020         101:020         101:020         101:020         1021:020         101:020         1021:020 <t< td=""><td></td></t<>	
1381-1390       1591-1600       1501-1600       1511-1600		-1310   1311-1	<u>320   1321-1330   1331-1340   1341-1350   1351-1360   1361-1370</u>	1371-1380 138	1-1110   11 81-1390   13	391-1400   14	401-1410	131-1140   1141-11 1411-1420   1421-1	430   1431-1	440   1441-1450   14	1-1180   1 51-1460   1	181-1190   1191-1200   1201-1210   1211-1220   1221-1230   1231-1240   1241-1230   1231-1240   1230-1240   1230-1240   1230-1240   1230-1240   1231-1240   1231-1240   1230-1240   1231-1240   1230-12	
2141-2150       251-2160       1161-2170       271-1280       2221-220       221-220		1581-1590   15 1861-1870   18	591-1600   1601-1610   1611-1620   1621-1630   1631-1640   1641- 371-1880   1881-1890   1891-1900   1901-1910   1911-1920   1921-	1650   1651-1660   1930   1931-1940	1661-1670 1941-1950	1671-1680 1951-1960	1681-169	0   <u>1691-1700</u>   <u>17</u> 0   1971-1980   19	01-1710   17 81-1990   19	11-1720   1721-1730 91-2000   2001-2010	2011-202	0   1741-1750   1751-1760   1761-1770   1771-1780   1781-1790   1791-1800   1801-1810   1811-1820   1821-1830   1831-1840   1841-1850   1851-1860   0   2021-2030   2031-2040   2041-2050   2051-2060   2061-2070   2071-2080   2081-2090   2091-2100   2101-2110   2111-2120   2121-2130   2131-2140   0   2021-2030   2031-2040   2041-2050   2051-2060   2061-2070   2071-2080   2081-2090   2091-2100   2101-2110   2111-2120   2121-2130   2131-2140   1	
2701-2710       2711-2720       2721-2720       2711-2720       2811-2820		2141-2150   21	151-2160   2161-2170   2171-2180   2181-2190   2191-2200   2201- 131-2440   2441-2450   2451-2460   2461-2470   2471-2480   2481-	2210   2211-2220	2221-2230	2231-2240	2241-225	0   2251-2260   22	61-2270   22	71-2280 2281-2290	2291-230	0 2301-2310 2311-2320 2321-2330 2331-2340 2341-2350 2351-2360 2351-2360 2351-2370 2371-2380 2381-2390 2391-2400 2401-2410 411-2420 0	
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		Topics											
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# **Question Data**

Click		Question	Number	Author's	Help	Most	Number	Difficulty	Overall
to		created	of	answer	requests	recent	of comments	rating	rating
view	Preview	<u>sort</u>	answers <u>sort</u>	popular?	<u>sort</u>	comment <u>sort</u>	<u>sort</u>		<u>sort</u>
<u>44 »</u>	Given the following statements about oxygenic photophosphorylation, which are true?	9:18pm, 29 Nov	2	24	(ES)	4:22pm, 012 Dec	4	medium / hard	2.78
<u>590 »</u>	Which answer is not a function or a type of RNA?	4:36pm, 23 Sep	1	.8	NO	0-	0	easy / medium	1.8
<u>1185 »</u>	Which mutation is expected to have the largest effect?	3:26pm, 03 Dec	1	.0	(ES	0-	0	easy	3.5

THE UNIVERSITY OF BRITISH COLUMBIA



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### Winter Session 2010 - Terms 1 & 2



\*Class exam average = 67%

### **Results from Combined Terms – Questions Answered**

# PeerWise Questions Answered	Exam Average <sup>2</sup> (%)	% of Class
<b>1- 20</b> <sup>1</sup>	65	60
21-50	68	18

<sup>1</sup> minimum requirement for full participation marks = 2 <sup>2</sup> exam averages p < 0.01



### **PeerWise Leaderboards**

Student scores calculated by an algorithm based on:

- question authoring.
- question answering.
- question ratings by other students.

Highest	scores of all studen	ts in this course
Rank	User	Total score (components)
1	churros	5397 (87q, 9140a, 1524r)
2	predilection	4624 (432q, 3334a, 177r)
3	dl	4332 (174q, 3356a, 291r)

### **PeerWise Leaderboards**







	Statistic <sup>a</sup>	Probability
One-way ANOVA	F(4,709)=16.76	p<0.001
Contrasts <sup>a</sup> :		
"1-50" to "51-100"	t(709)=2.60	p<0.01
"1-50" to "101-150"	t(709)=1.36	p>0.05
"1-50" to "151-200"	t(709)=1.84	p>0.05
"1-50" to "200+"	t(709)=6.28	p<0.01
"51-100" to "101-150"	t(709)=1.27	p>0.05
"51-100" to "151-200"	t(709)=0.785	p>0.05
"51-100" to "200+"	t(709)=2.71	p<0.001
"101-150" to "151-200"	t(709)=0.49	p>0.05
"101-150" to "200+"	t(709)=4.54	p<0.001
"151-200" to "200+"	t(709)=0.3.84	p<0.001

<sup>a</sup> contrast tests assumed equal variances



# **PeerWise Leaderboards Results**

Students Ratings	Exam Averages*					
	Term 1	Term 2				
Top 200 students	71	73				
All other students	65	65				

\*p<0.01

# **Some Interesting Numbers**

### **Out of >2800 questions posted:**

- 20 = % of questions were rated as medium difficulty or higher.
- 4 = highest question rating out 5 very few examples!
- 200 or less = # of students answering any one question.
- 10 = % of students authored greater than required number of questions (3).
- 85 = % of the class answered between 1 -100 questions.



# **Other Challenges and Comments**

- Reviewing or marking questions not feasible in large course however our Teaching Assistants can scanned database periodically.
- Encourage students to challenge themselves and others students felt many of the questions were too "easy".
- Provide a schedule and keep it simple.
- Balance activities with structure and free-form to encourage voluntary participation among students.
- Provide guidelines for writing multiple choice questions e.g. on learning management system.

### Acknowledgements

Many thanks to...

#### **Biology 112 Team**

#### Instructors

Tracy Kion Erin Gaynor Ehleen Hinze David Oliver

#### PeerWise Support Paul Denny – U. of Auckland

#### **Graduate Teaching Assistants**

Rodgoun Attarian Joseph Chao Morgan Roberts Marli Vlok

#### **Undergraduate Course** Assistants

Marlo Firme Liz Imrie Jasmine Yadana





### http://peerwise.cs.auckland.ac.nz/

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A http://perwise.cs.auckland.ac.nz/at/lubc.ca	👻 🔄 😽 🗙 📴 Bing
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DeerWise	
/elcome	
PeerWise supports students in the creation, sharing, evaluation and discussion of assessment questions. Students of a participating course develop multiple-choice questions with associated explanations and contribute them to PeerWise. These questions are then available to other students in the course and can be answered for study nummers, critiquier and related for difficulty and number.	Welcome to PeerWise for The University of British Columbia
perposes, compare and successes, while rates the summary wine quarty. Developing effective multiple-choice questions requires that the associated concepts are thoroughly understood and provides a good opportunity to reinforce material that has been recently learned.	Already joined? Welcome back
The collection of questions and responses provides timely feedback to instructors on how students are performing and how various course topics are perceived, and becomes a valuable study resource for students. The process of answering, evaluating and discussing questions developed by their peers enables students to compare their performance and understanding with that of other students studying the same material.	Password: Forpotten your password? Get a new or
Ask Creating a new question requires a student to reflect on the important concepts and learning outcomes of a course. Developing effective alternatives and providing a useful explanation of the answer challenges students and heips to reinforce their understanding.	Like to join? Please register
	Registration is very simple
Share All contributed questions are available to every student in the course. The questions can be filtered based on the topics that they address, their quality or difficulty ratings, the number of responses they have received, or simply when they were created. Students can also discover good questions by choosing to follow the authors of questions that they perceive to be valuable.	-
Learn Answering a question provides immediate feedback to a student, including an explanation of the correct answer. All previously submitted answers are also shown, offering insight to a student about the understate evaluate the question's quality, and to take part in a discussion of the question with their peers.	anding of their peers. Students are given an opportunity to
PeerWise is very simple to use. It takes just a minute to create a new repository that can be accessed anywhere and anytime. PeerWise can help to establish a learning community in your class that incorporates collaborative learning a existing teaching materials and course organisation.	and peer tutoring, and can be utilised easily alongside your



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#### Distribution of Grades for Top 200 Leaderboard Students



### **Leaderboard Data**

**PeerWise "Leaderboards"** Exam Averages for Term 2



**Top Students in Question Ratings**