Module evaluations- Yeast complex colonies

1) In general, what parts of this module did you enjoy the most? What parts promoted the most learning for you? I liked the use of R and all the interactive learning activities because I find it easier to understand a topic by actually practicing that concept rather than talking about it.

2) In general, what suggestions do you have for improving this module in the future? What parts did you think did not promote your learning? Everything was generally helpful, but I think it would have been good to spend a little more time talking about the biological pathways involved w/ making complex colonies (cAMP-PKA pathway) I felt like we talked a lot about pathways during the conclusion of the module but I didn't really understand the pathway very well to begin with.

3) Were the goals of the module clear? Do you feel like those goals were accomplished? Yes, the goals were clear and I appreciated that they were visible on the board during each class. I do think we accomplished those goals throughout the various class activities.

4) List 3 concepts that you will take away from this module that you did not know before. 1) Coding in R

2) The ways in which data sets can be manipulated and analyzed

3) Determining relationships between colony morphology and allelic variation in the genes of interest.

5) How did you feel about the balance of time spent on various activities- lecture, R workbook, activities, discussion? Would you increase or decrease the time allocated on any of these? I think each one had enough time dedicated to it. I think the paper discussion got a little overwhelming in the amount of questions to answer and the amount of time spent trying to answer those questions and discuss their overall meaning. A break in the discussion or a little bit of a stronger guidance to pace the discussion would have been helpful

6) Fill out the table below:

Activity	Effectiveness of implementation (1-5, one being the lowest)	Importance for your learning (rank 1-4, 1 being the least important)
Lectures	4	3
Discussion of paper	3	1
Active learning activities	4	4
R workbook	5	2

7) Did you find the active learning activities to be useful (bulk segregant, calculating distance measures, and functional enrichment)? Which ones were most effective and why? I think they were very effective tools for teaching the methods by which researchers manipulate and analyze their data sets. I think I learned most from the functional enrichment and bulk segregant activities.

8) After this module, how comfortable do you feel with R? On a scale from 1-5 how likely do you think it is that you will take a programming class in the future. Did this module increase or decrease that likelihood? I feel like I got a good introduction to R and the things it can do. I know I will be taking a stats course in the future, so the R component of this module will be very useful to me.

9) Did you feel like you had a voice in the classroom? Did anything about the module structure make you uncomfortable? No, I thought everything was good.

10) Any other thoughts you would like to share?

Nope.

LaJ77

Module evaluations- Yeast complex colonies

1) In general, what parts of this module did you enjoy the most? What parts promoted the most learning for you?

I enjoyed the activelearning activities the most, however I think the lectures promoted the most learning.

2) In general, what suggestions do you have for improving this module in the future? What parts did you think did not promote your learning?

The wording of particular questions created unnecessary confusion.

I did not think the paper discussion promoted my learning. ~~[illegible]~~ The information could have been better relayed in a lecture.

3) Were the goals of the module clear? Do you feel like those goals were accomplished? yes, yes

4) List 3 concepts that you will take away from this module that you did not know before.

1. a new way to use the data from a microarray with R ~~[illegible]~~
2.

5) How did you feel about the balance of time spent on various activities- lecture, R workbook, activities, discussion? Would you increase or decrease the time allocated on any of these?

I felt it was balanced pretty well. however, we were not allowed ~~to~~ time to read everything in the workbook and expected to ~~[illegible]~~ go straight to the coding or activity.

6) Fill out the table below:

Activity	Effectiveness of implementation (1-5, one being the lowest)	Importance for your learning (rank 1-4, 1 being the least important)
Lectures		4
Discussion of paper		1
Active learning activities		3
R workbook		2

7) Did you find the active learning activities to be useful (bulk segregant, calculating distance measures, and functional enrichment)? Which ones were most effective and why?

I did find them useful. The most effective was the ~~bulk segregant~~ calculating distance measures because it gave a simple picture of what the program was doing.

8) After this module, how comfortable do you feel with R? On a scale from 1-5 how likely do you think it is that you will take a programming class in the future. Did this module increase or decrease that likelihood?

I feel moderately comfortable with R, however this module ~~did not~~ seemed to be only retyping what was in the workbook. We weren't given the tools to do the work, but rather told exactly what to type.

9) Did you feel like you had a voice in the classroom? Did anything about the module structure make you uncomfortable?

yes, no

10) Any other thoughts you would like to share?

Module evaluations- Yeast complex colonies

1) In general, what parts of this module did you enjoy the most? What parts promoted the most learning for you?

I thought it was good to break up the R sections and the other activities to enhance our learning. It was also helpful to have simple activities that show the basic significance of the following R activities.

2) In general, what suggestions do you have for improving this module in the future? What parts did you think did not promote your learning?

A lot of information was thrown at us at the beginning of each class during the introduction that was hard to retain while doing all of the activities. Maybe break up the information throughout the class so we realize their relevance.

3) Were the goals of the module clear? Do you feel like those goals were accomplished?

The goals were clear and they were accomplished!

4) List 3 concepts that you will take away from this module that you did not know before.

1. analyzing microarray data
2. Drawing charts that will help simplify gene expression
3. enhanced my skills w/ R, learned how to use new functions

5) How did you feel about the balance of time spent on various activities- lecture, R workbook, activities, discussion? Would you increase or decrease the time allocated on any of these?

You guys balanced all of the activities really well! Wouldn't change a thing about time management.

6) Fill out the table below:

Activity	Effectiveness of implementation (1-5, one being the lowest)	Importance for your learning (rank 1-4, 1 being the least important)
Lectures	2	5
Discussion of paper	5	5
Active learning activities	5	5
R workbook	4	4

7) Did you find the active learning activities to be useful (bulk segregant, calculating distance measures, and functional enrichment)? Which ones were most effective and why?

Very useful! Need to put these ideas into simple, basic forms first to make sure we understand everything.

8) After this module, how comfortable do you feel with R? On a scale from 1-5 how likely do you think it is that you will take a programming class in the future. Did this module increase or decrease that likelihood?

Very comfortable w/ R. → 3, didn't affect the likelihood.

9) Did you feel like you had a voice in the classroom? Did anything about the module structure make you uncomfortable?

You forced all of us to be interactive which was good! kept us on our toes and made sure we were following along

10) Any other thoughts you would like to share?

You should implement more activities w/ food — Thanks for the M&Ms!

Module evaluations- Yeast complex colonies

1) In general, what parts of this module did you enjoy the most? What parts promoted the most learning for you?

Learning to apply programming to biology - R.

2) In general, what suggestions do you have for improving this module in the future? What parts did you think did not promote your learning?

- Easier terminology b/w simple/complex
- A hierachial diagram of keeping track of genes/allel frequency

3) Were the goals of the module clear? Do you feel like those goals were accomplished?

Yes I felt like I got a good intro to how microarrays are analyzed.

4) List 3 concepts that you will take away from this module that you did not know before.

- R
- Diff b/w significance & importance
- Heat map application to gene expression

5) How did you feel about the balance of time spent on various activities- lecture, R workbook, activities, discussion? Would you increase or decrease the time allocated on any of these?

This fairly well planned out in my opinion.

6) Fill out the table below:

Activity	Effectiveness of implementation (1-5, one being the lowest)	Importance for your learning (rank 1-4, 1 being the least important)
Lectures	4	5
Discussion of paper	3	4
Active learning activities	4	5
R workbook	5	5

7) Did you find the active learning activities to be useful (bulk segregant, calculating distance measures, and functional enrichment)? Which ones were most effective and why? Yes because it is an experience to draw upon that shows how, at least in theory, the computer "spits" out the answer.

8) After this module, how comfortable do you feel with R? On a scale from 1-5 how likely do you think it is that you will take a programming class in the future. Did this module increase or decrease that likelihood?

5, programming future.

9) Did you feel like you had a voice in the classroom? Did anything about the module structure make you uncomfortable?

Yes + no, respectively

10) Any other thoughts you would like to share?

I thought you both had a thorough understanding of the material, and all though there were some first time learning curve / logistical errors — that is expected.

Great job + most of all: Thank You!

KP's view/comments - TA Comments!

Module evaluations- Yeast complex colonies

1) In general, what parts of this module did you enjoy the most? What parts promoted the most learning for you?

The workbook & associated activities were really well-presented and organized. I love that the students got some programming experience in addition to the gene expression analysis

2) In general, what suggestions do you have for improving this module in the future? What parts did you think did not promote your learning?

I think the paper discussion could be improved, though I understand the difficulty in managing/directing a discussion among 6 unwilling participants. Maybe a jigsaw activity w/ students taking individual sections?

3) Were the goals of the module clear? Do you feel like those goals were accomplished?

I really like how the overarching goal + daily objectives were clearly laid out in each meeting. Overall, I feel you met the goals you set forth.

4) List 3 concepts that you will take away from this module that you did not know before.

hexa- & octospored yeast exist! :)

5) How did you feel about the balance of time spent on various activities- lecture, R workbook, activities, discussion? Would you increase or decrease the time allocated on any of these?

I felt the paper discussion went a little overlong. But the other activities were well-paced. The students were happy to get out early most days, as it was a novelty for this course.

6) Fill out the table below:

Activity	Effectiveness of implementation (1-5, one being the lowest)	Importance for your learning (rank 1-4, 1 being the least important)
Lectures	4	2
Discussion of paper	3	3
Active learning activities	4	4
R workbook	5	4

7) Did you find the active learning activities to be useful (bulk segregant, calculating distance measures, and functional enrichment)? Which ones were most effective and why?

The bulk segregant & distance matrix were great - well designed + explained. I was... elsewhere for the func. enrichment activity

8) After this module, how comfortable do you feel with R? On a scale from 1-5 how likely do you think it is that you will take a programming class in the future. Did this module increase or decrease that likelihood?

I've taken a number of intro to R/ data carpentry courses/workshops and I found this to be a well laid out module. If time permits in the future, maybe some short activity would be a good add.

9) Did you feel like you had a voice in the classroom? Did anything about the module structure make you uncomfortable?

10) Any other thoughts you would like to share?

Module evaluations- Yeast complex colonies

1) In general, what parts of this module did you enjoy the most? What parts promoted the most learning for you?

The coding was the most enjoyable for me, and the most educational. I also enjoyed

2) In general, what suggestions do you have for improving this module in the future? What parts did you think did not promote your learning?

I think the review from on Day 2 over Day 1 material was longer than necessary

3) Were the goals of the module clear? Do you feel like those goals were accomplished?

Yes and yes.

4) List 3 concepts that you will take away from this module that you did not know before.

1) A little bit of basic coding in R
2) Better understanding of heatmaps + how to read
3) I know too much about CYR1 now.

5) How did you feel about the balance of time spent on various activities- lecture, R workbook, activities, discussion? Would you increase or decrease the time allocated on any of these?

Maybe less discussion, or if you keep the amount of discussion, less questions for us to answer, we always seemed to have very long discussion ~~one~~

6) Fill out the table below:

Activity	Effectiveness of implementation (1-5, one being the lowest)	Importance for your learning (rank 1-4, 1 being the least important)
Lectures	3	2 or 3
Discussion of paper	4	3 3
Active learning activities	4	1 4
R workbook	5	4 4

7) Did you find the active learning activities to be useful (bulk segregant, calculating distance measures, and functional enrichment)? Which ones were most effective and why?

The functional enrichment was most useful to me, along with distance measures, because it lined up most closely with the workbook and was easier to follow.

8) After this module, how comfortable do you feel with R? On a scale from 1-5 how likely do you think it is that you will take a programming class in the future. Did this module increase or decrease that likelihood?

I'm curious to learn more, but I wouldn't attempt doing anything on my own yet. 3 and yes, it increased it a bit.

9) Did you feel like you had a voice in the classroom? Did anything about the module structure make you uncomfortable?

Voice: Yes, no.

Structure: No, it was good

10) Any other thoughts you would like to share?

I think the only suggestion would be work on division of labor between both of you. It felt like you were almost competing at times, rather than co-teaching.

Module evaluations- Yeast complex colonies

1) In general, what parts of this module did you enjoy the most? What parts promoted the most learning for you?

I liked learning more about R & how microarray data can be analyzed in R.

2) In general, what suggestions do you have for improving this module in the future? What parts did you think did not promote your learning?

Discussing complex traits/simple traits and complex morphology/simple morphology got confusing at times. Questions were often confusing. could not tell what they were asking.

3) Were the goals of the module clear? Do you feel like those goals were accomplished?

Goals were clear & accomplished.

4) List 3 concepts that you will take away from this module that you did not know before.

- some R intuition
- knowledge of how heat maps are organized/ how to read them
- how distance measures can be calculated

5) How did you feel about the balance of time spent on various activities- lecture, R workbook, activities, discussion? Would you increase or decrease the time allocated on any of these?

Decrease amount of time spent on activities. Think enrichment activity could be replaced w/ more lecture. really simple

6) Fill out the table below:

Activity	Effectiveness of implementation (1-5, one being the lowest)	Importance for your learning (rank 1-4, 1 being the least important)
Lectures	4	3
Discussion of paper	4	4
Active learning activities	4	2
R workbook	4	1

7) Did you find the active learning activities to be useful (bulk segregant, calculating distance measures, and functional enrichment)? Which ones were most effective and why?

I found ~~the~~ bulk segregant & distance measures to be ~~most~~ effective. The functional enrichment activity took too long to make a simple point. ~~would~~

8) After this module, how comfortable do you feel with R? On a scale from 1-5 how likely do you think it is that you will take a programming class in the future. Did this module increase or decrease that likelihood?

Still not entirely comfortable but would like to learn more because it is a powerful tool.

9) Did you feel like you had a voice in the classroom? Did anything about the module structure make you uncomfortable?

Yes, I had a voice. Instructors were readily available to ask questions.

10) Any other thoughts you would like to share?

Sometimes we spent too much time going over basic biology. In order to take ~~&~~ this course ~~we~~ students have to take molecular biology & genetics/evolution. We just don't always answering questions especially when Dr. Armaleo is listening b/c he ~~is~~ can be very picky w/definitions. I think the thing biology majors are most unfamiliar w/ is coding analyzing ~~entirely~~ big data sets.

Module evaluations- Yeast complex colonies

1) In general, what parts of this module did you enjoy the most? What parts promoted the most learning for you?

I enjoyed the demonstrations where people in the class would share their hypothesis about a question and then discuss it as a class,

2) In general, what suggestions do you have for improving this module in the future? What parts did you think did not promote your learning?

Improve clarity in worksheets. Sometimes questions were hard to understand or seemed to lead us in directions different from the goal and what you wanted us to focus on.

3) Were the goals of the module clear? Do you feel like those goals were accomplished? I think the goals of the module were clear. I feel like we learned about relationships between gene expression, variation, and phenotype.

4) List 3 concepts that you will take away from this module that you did not know before.

Basic Programming in R
Analyzing heat maps to discover relationships and clusters in micro array data
creating dendrograms

5) How did you feel about the balance of time spent on various activities- lecture, R workbook, activities, discussion? Would you increase or decrease the time allocated on any of these? I think it was well balanced, wouldn't change it.

6) Fill out the table below:

Activity	Effectiveness of implementation (1-5, one being the lowest)	Importance for your learning (rank 1-4, 1 being the least important)
Lectures	3	2
Discussion of paper	2	3
Active learning activities	4	4
R workbook	1	1

7) Did you find the active learning activities to be useful (bulk segregant, calculating distance measures, and functional enrichment)? Which ones were most effective and why? I think they were useful for learning concepts but at times tedious. Most effective was the bulk segregant analysis for seeing how this data is sorted

8) After this module, how comfortable do you feel with R? On a scale from 1-5 how likely do you think it is that you will take a programming class in the future. Did this module increase or decrease that likelihood? 5 taking compsci next semester this module did make me more interested in the subject

9) Did you feel like you had a voice in the classroom? Did anything about the module structure make you uncomfortable? 3

1. Yes and 2. No

10) Any other thoughts you would like to share?

Module evaluations- Yeast complex colonies

1) In general, what parts of this module did you enjoy the most? What parts promoted the most learning for you?

using R. Plotting the heat maps.

2) In general, what suggestions do you have for improving this module in the future? What parts did you think did not promote your learning?

To upload 'lecture notes' before class for students to briefly read through.

3) Were the goals of the module clear? Do you feel like those goals were accomplished?

yes. Going through a summary at the start and end of class consolidates the lesson.

4) List 3 concepts that you will take away from this module that you did not know before.

Colony morphology has epistatic interactions.
Bioinformatics is essential in biology

5) How did you feel about the balance of time spent on various activities- lecture, R workbook, activities, discussion? Would you increase or decrease the time allocated on any of these?

I think the ratio of time spent is appropriate. Although it is probably more efficient if explanation was done after the R-workbook rather than having the instructor go to the diff grps individually during the session.

6) Fill out the table below:

Activity	Effectiveness of implementation (1-5, one being the lowest)	Importance for your learning (rank 1-4, 1 being the least important)
Lectures	4	4
Discussion of paper	4	5
Active learning activities	5	5
R workbook	5	5

7) Did you find the active learning activities to be useful (bulk segregant, calculating distance measures, and functional enrichment)? Which ones were most effective and why?

Generally useful in understanding the concepts. Calculating distance measures is the most useful.

8) After this module, how comfortable do you feel with R? On a scale from 1-5 how likely do you think it is that you will take a programming class in the future. Did this module increase or decrease that likelihood?

Its easy now because the code is already given, but it is likely not this easy. 3/5. Neutral.

9) Did you feel like you had a voice in the classroom? Did anything about the module structure make you uncomfortable?

yes. Discussion was slightly informal, facilitate discussion.

10) Any other thoughts you would like to share?