Appendix 6: post semester interview script (italicized words were not spoken to students)

Icebreaker questions:

1. Finished with finals?
2. summer plans?
3. What's the coolest thing you learned in Biocore 303/304?
4. Michelle's been encouraging you to use Protein Explorer this semester…..how has that gone?

- Interview will take ~20 minutes
- We are working with Michelle to find out how you learn about molecular structure and function.
- Answers are NOT graded.
- It's o.k. if you don't know an answer. If question is unclear, let us know.

5. Can you tell me what you've learned about protein 1°, 2°, 3°, and 4° structure? *(gently correct any wrong answers)*

- focus today is on a specific biomolecule. *Show them physical, hand-held model of nonphosphorylated insulin receptor tyrosine kinase and Protein Explorer (PE), pointing to computer screen.*
- You haven't seen this PE image in Biocore 303 lecture or in the 304 lab.
- can use either or both of these tools to help answer the questions. Feel free to hold model or change PE image.
- can also use paper and pencil
- I'll explain model colors after I ask you a few questions.

6. What kind of biomolecule do you think this is: lipid, protein, nucleic acid, or carbohydrate?
7. What makes you say this? *(If they don't get this right, tell them it's a protein.)*
8. Can you find the N-terminus? *(If they say they can't, hint that they can use PE.)*
9. Can you point out any alpha helices and/or Beta sheets? (*If they say they can't, help them find them.)*
10. Does this biomolecule show any quaternary structure?
11. Is this a single protein chain or a dimer?

- Let me tell you about the coloring scheme for this biomolecule *(refer to both the model and PE*).
- red end represents the carboxyl end of the single peptide chain that makes up this molecule.
- blue end represents the amino terminus.
- A few of the individual amino acid residues are shown in cpk coloring (*show them the color code key).*
- Three regions of the backbone are colored green, yellow and orange. These regions have specific functions.

12. Do you have any questions about the coloring scheme I just described?
13. Can you name any of the amino acid sidechain residues that are displayed? (*If student does not correctly identify the tyrosines, let them know where they are.)*
14. Can you take a guess as to what this molecule is and/or what its function might be?

After student answers question 14, present student with second (phosphorylated) model and open second PE window.

- This is a different pdb file and model of the same molecule.
- Think of these as "before" and "after" snapshots.
- Please take your time to examine the 2 molecules.
- Let me know when you are ready to answer a few more questions about it.

Tell them you need to go talk with Jennifer about a problem you're having with the PE program (or whatever diversion you can think of that makes them think you're not paying attention to them).

15. Can you identify the differences between the first and the second version of the molecule?
    If student does not correctly identify the phosphate groups, point out:
    - Phosphorylated tyrosines
    - ATP
    - purple substrate protein
16. Now that you know these details, can you propose a function for a. the yellow region? b. The orange region? *(If they don't know or get this wrong, tell them yellow portion binds ATP and the orange area catalyzes the transfer of phosphorous to tyrosine.)*
17. Can you take a guess as to what this molecule is and what it does?
    If they don't know or get this wrong, use a whiteboard to diagram the following points:
    - It is an insulin receptor tyrosine kinase molecule
    - Only a single cell receptor shown
    - only cytosolic portion shown
    - extracellular portion where insulin binds is not shown
18. Dr. … spent some time in lecture telling you about receptor tyrosine kinases. Can you tell me what you know about them?
19. Now that you know that this model and the PE image represent the cytosolic portion only of one receptor tyrosine kinase, can you describe what happens to this receptor when insulin binds? (*If they do not correctly or completely state the answer, fill in any missing gaps for them.*)

- We're almost done now!

20. Can you think of at least two mutations that would keep this receptor from transferring a signal after insulin is bound? (*If their answer is too general, ask for a specific example.)*
21. What mutations in this receptor tyrosine kinase might cause it to be constitutively activated (or always on)? (*They may already have mentioned this sort of mutation by answering the preceding question.*)
    - I don't have any more questions for you.
22. Do you have any remaining questions or comments for me?
    - Could you please fill out this brief survey?