Cat. Howard Feedback Work Group B Recommendations and Scientific and Engineering Practices Recommendations

Guiding Questions- High School Courses

1. Does each course follow a complete and logical development of science concepts presented? If not, what suggestions do you have for improvement?

Biology: Yes. It starts with the nature of science, scientific inquiry, (love the addition of social justice issues), to cellular biology, to biological structures, cell reproduction, genetics, biological evolution, environmental interdependence. To me this sequence makes perfect sense.

Chemistry: Yes—beginning with what is science and covering terms critical to scientific literacy like hypothesis, theory, moving to the scientific method and ethics (I love the addition of ethics), physical properties, elements and chemical properties, atomic structure, bonding, chemical calculations involving moles, empirical and molecular formulas, chemical equations, stoichiometry, gas laws, solutions, acids and bases, thermodynamics, nuclear chemistry. It is the same sequence most textbooks use to teach general chemistry.

IPC: Yes—it follows the same early sequence as biology and chemistry, but after scientific ethics about half of the course seems to be devoted to physics concepts starting with basic kinematics and a little dynamics, some electricity and magnetism. The second half covers chemistry concepts starting with atomic structure, then periodic table, physical and chemical properties, chemical reactions and balanced equations, and nuclear energy (as part of energy from chemical processes).

Physics: Yes—It follows the standard college textbook sequence of kinematics, dynamics, electricity and magnetism, waves. Usually this is followed by some relativity topics and a bit of quantum mechanisms that is left off here.

2. Do the standards for the course(s) adequately address scientific concepts? If not, please give examples of how the standards might be improved.

Biology: Yes. The standards address the concepts. I would like to commend the committee for the language changes—this document is much better than the one we started with. The writing is very clear and concise. I think a teacher would have a much better chance of knowing how to address each TEK than he or she might have before these revisions.

Chemistry: The standards do address the concepts. I like the changes. In particular I appreciate the use of “construct.” It goes beyond just lower level Bloom’s verbs.

IPC: yes, I think so. This course is harder for me because by nature it is a survey course—sort of wide and not as deep. It’s hard for me to resist the depth!

Physics: yes—the standards adequately address the concepts.

3. Are there any gaps or concepts missing that should be addressed? Are there specific areas that need to be updated to reflect current research?

Biology: Is the Linnean organization of biology covered in a different course? How about differences between plant and animal cells? I know it's not possible to cover everything in one year!

Chemistry: I may have overlooked it—but didn't see anything about chemical nomenclature.

IPC: There are many gaps here—especially on the chemistry half of the course. However, as a survey course, I understand that not every salient topic can be covered. This is an introductory course and should serve to pique interest as well as inform. I think it does that.

Physics: I didn't notice any gaps except at the end with the omission of relativity and quantum mechanics. I do understand, however, that students may not have the math tools to explore these topics in any depth. I agree that, in the absence of these math skills, time is best spent really making sure the topics that are included are covered well.

4. Do the high school courses course(s) sufficiently prepare students for postsecondary success? If not, please provide suggestions for improving the standards.

Biology: I think it would give the students who took this class a great advantage in a majors biology course. It doesn't cover all of the topics in our two-semester sequence but would provide adequate background and framework for the students to build on.

Chemistry: As a chemistry professor myself, I would be thrilled if students came to my general chemistry class having been exposed to all of these concepts. Yes!

IPC: I'm not sure this prepares for postsecondary success. I think it may more prepare for success in a subsequent chemistry or physics course—then that course would help prepare for postsecondary success.

Physics: yes. I think this class would prepare a student very well for a college physics course.

5. Does each course include sufficient standards focused on laboratory and field investigation?

Biology: Yes. These recommend, I think—the document loops back to the Scientific and Engineering Practices group who wrote that 40% of class time be devoted to lab experiences. So I think this is a 40% recommendation as well. I really applaud that. I believe that the hands-on parts of science are what really engages students and helps them to decide to pursue careers in science. In addition, the TEKS in this area of Scientific and Engineering Practices each lend themselves to experiential learning.

Chemistry: See the answer for biology above.

IPC: same as above.

Physics: same as above

6. Are the student expectations clear and specific? If not, please give examples of how the language might be improved.

Biology: Yes very much clearer than in the original document!

Chemistry: Yes—again the changes have really made this a much better and useful document.

IPC: yes

Physics: yes, the expectations are clear and specific. Like with biology and chemistry, I can see that this group really improved this document using much clearer and more succinct terms that will be very helpful to the teachers.

7. Are there student expectations that are not essential or unnecessarily duplicative and can be eliminated? If so, please identify by course and student expectation number, e.g., Physics 4.B.

Biology: None that occur to me.

Chemistry: I didn't see any topics that I thought should be eliminated.

IPC: none to eliminate.

Physics: non to eliminate.

GUIDING QUESTIONS- SCIENTIFIC AND ENGINEERING PRACTICES

1. Are the student expectations in the science and engineering practices clear and specific? If not, please give examples of how the language might be improved.

Yes. Generally reading through the draft, I think that the additions, deletions, and text relocation have made this a much better document. The wording is much more direct and clearer. For example "answer questions" is so much better than "seek answers," "calculations" is so much better than "use mathematical concepts and processes," and "scientific discussion" is far superior to scientific argumentation." I also appreciate the list of appropriate tools for Biology, IPC, and Chemistry in 1D. The lists seem very thorough. I can't think of anything I would add or take out.

2. Do the science and engineering practices sufficiently prepare students to engage in investigative and engineering design processes? If not, please provide suggestions for improving the standards.

Yes. I can't really say that meeting these TEKS alone would prepare a student for a particular college-level course but having these skills would very much help students to be successful in college courses such as physics and chemistry and in early engineering survey courses.

3. Are there any gaps or practices missing that should be addressed?

   I've read through the document a few times and do not notice any gaps.