

Scientific Integrity A Primer for Undergraduates

Are you planning to be a scientist?

A doctor?

A dentist?

How about an ophthalmologist or pharmacist?

Regardless of your career plans, the most important characteristic or skill you can offer is your integrity.

What IS integrity?

Most people probably think of integrity as a personal thing, an issue of character. For example, someone who thinks "I am a good person" probably would consider themselves to be a person of integrity.

But integrity in the professions is more specific than being a "good person," because the definition of "good" can vary and your measurement of "good" can differ from someone else's. For example, some people think they are good because they have never been in trouble or because their intentions or "heart" are good.

Professional integrity, on the other hand, requires us to not only be "good" by our own standards and definitions, but by the standards and definitions of our employer and our profession, as well as perhaps, of society.

Let's go over a very concrete example.

A few years back, there were several pharmacists in the United States who made national headlines because they were refusing to fill prescriptions for birth control or the "morning after pill." Women, prescribed these drugs by their personal physicians, were being turned away from pharmacies even if there was not another pharmacy for miles around to which the women could turn.

These pharmacists were acting in ways that upheld their personal values and beliefs, in ways that, one could say, were aligned or congruent with themselves. So, almost anyone would agree that these pharmacists were exhibiting personal integrity, that is, congruency between their rhetoric (what they say) and their actions (what they do).

However, at the same time, these pharmacists may have been violating professional integrity standards. Pharmacists are not in the profession of deciding what drugs people should take---that's a doctor's job. By refusing service to women who had no alternatives, these pharmacists were not being professional but using their profession to impose their personal beliefs on their clients.

The illustration above is a concrete example of the very tricky ethical minefield of professional integrity.

As a professional (i.e., doctor, pharmacist, scientist), you will face complex ethical dilemmas like this on a regular basis and you will be expected to be able to problem solve through them and do "the right thing" and,

when you make your choice of action, be willing to be held accountable for whatever consequences come about as a result of your decision.

This type of professional integrity is critically important for all professions, but perhaps for no professions more than those held by university graduates and those that serve society in some way (and, I would argue, ALL professions serve society---look at the financial profession and how that has NOT served society well in the last couple of years).

What does this mean for YOU as an undergraduate?

You are a professional-in-training.

For example, in these physics lab classes, we are not simply trying to teach you physics concepts, but ways of thinking, acting, and problem-solving. The labs are your opportunity for EXPERIENTIAL learning---yes! The opportunity to learn in an active way rather than by sitting through yet another lecture.

What you learn in the physics labs has DIRECT relation to your future professions---no matter what you are going to be doing. Just some examples of the learning outcomes are:

1. Complex problem solving---in the physics labs, you will encounter problems that you have absolutely NO idea how to solve! The point of these problems is not to “test” you to see if you can look up the answers on the internet or secure the help of a smarter friend, but to give you the experience of struggling through a complex problem in order to learn the associated skills. What are these skills? Persistence, trial-and-error testing, deductive reasoning, application of theory to practice, focus despite difficulty---and these are just some of them! Everyone is different, of course, so what you can learn will be unique. But, believe it or not, there is some value in first attempting to solve problems on your own with your own brain!
2. Scientific Method---the scientific method (the process of discovery) is not just something useful in research professions, but doctors and other practitioners find the method useful for answering questions for which there are no known answers. And, there WILL be questions that you will encounter throughout your life for which the answer will not be found on the internet! Again, the goal is not to get at the right answer, but to go through the process.
3. Truthful Reporting---one skill we learn through the physics labs (or any labs for that matter), is how to report with truth and transparency the results of our study and the learnings we had. This is actually a learned skill, as it can be easier to manipulate findings---especially when the real findings are not the ones we were hoping to get! Integrous doctors, pharmacists, scientists and other professionals know that communicating truthful information is always more important than communicating information that will make one look better in the eyes of the receiver of that information. Although it is more difficult, nothing is more important than truthful reporting.

Hopefully this information helps you see how you can engage in your physics labs as useful learning experiences---no matter your future profession!

Indeed, being a student with integrity is preparation for your future profession. In fact, think of being a student as your profession at this time. Being a student is your job, and just like other jobs or professions, it has tenets for professional integrity. This means that sometimes you will be expected to conduct your work (e.g., your academic assignments, labs, tests) according to standards with which you may disagree.

For example, although you may prefer to have a “cheat sheet” when you take exams, you know that you are not permitted to do so unless designated by the instructor. Thus, sneaking in a “cheat sheet” to an exam would be considered a violation of your professional or academic integrity. Why is this? Well, first it is a matter of fairness. Why should you get to use a cheat sheet if no one else does? This is what we call “an unfair advantage.” Second, it is dishonest. When the instructor is grading your exam, he or she assumes that you completed it without assistance and so, if you had assistance in the form of a “cheat sheet,” it is a dishonest assessment of your individual ability. Third, it is a sign of weak character, of someone who is so focused on the ends (i.e., getting a certain grade) that s/he is willing to do whatever it takes to get there despite the harm s/he is causing to self or others. And frankly, we are hoping to graduate students from UCSD who more often than not, put the means BEFORE the ends!

One of the major challenges that students have in physics labs (as well as other science labs) is understanding the line between collaboration and copying or “using your resources” and doing your own work. Tenets of professional integrity in the sciences tell us that collaborating with others to learn and solve problems is a good thing! But, these same tenets also tell us that we acknowledge the assistance and work of others and the way those others have shaped our own thinking and ideas. So, for example, when researchers collaborate to do a study and write a paper, ALL OF THEIR names are listed as authors of the paper and they receive “group credit” for that work. Even those who “helped” but didn’t directly contribute to the writing (e.g., lab assistants) are acknowledged in some way in the paper or the research project. However, if one scientist copied the words, ideas or data of another and used those in his/her own publication, everyone would call that dishonesty.

This is both similar and different for you as an undergraduate. It is similar because you should never use the words or ideas or data of others (even others in your lab group) without attribution. It is different because most of your assignments are NOT group assignments for which you will get group credit (i.e., one assignment is submitted for one grade for everyone in the group). Your assignments, generally, are supposed to represent what you know and think and your ability to solve problems. This does not mean that you cannot talk about concepts and ideas with others, but it does mean that you should not simply copy the words and ideas of others.

So, to maintain your professional integrity as a student, we suggest that you approach individual assignments in the following manner:

1. Attempt to do the assignment/problems on your own---using your own brain and the resources from the class (lecture notes, text book, etc).
2. As you encounter problems that you get stuck on, realize that you have two course of action from which you can choose:
 - a. First, choose not to learn how to solve the problem and simply hand in the assignment with it completed to the best of your individual ability. You may have to make this choice, for

example, if you've left the assignment to the last minute and do not have time to seek the appropriate assistance.

- b. Second, you can choose to seek out appropriate assistance to learn how to solve the problem (NOTE that the language here is not to "get the right answer" but to "learn how to solve the problem." This is not just semantics but representative of a fundamental difference in motivation which will shape your decisions for action). What is the appropriate assistance? Your best bet is to go to the Physics Tutorial Lab, your TA's office hours, or your Instructor's office hours. If you do have a study group, you can also work with them but REMEMBER---you should not get them to solve the problems for you but, perhaps, explain the concepts over which you are struggling. You should still solve the problems on your own. Note that this course of action takes more time and requires more planning and less procrastination.
3. At all times, remember that in individual assignments you are receiving an individual grade for your individual ability. The grade should reflect the extent to which you LEARNED the material. This means that once you turn the assignment in, if the TA or Instructor asked you to resolve the problem on your own, you would be able to do it. If you couldn't do that, than you probably copied too much of your assignment from others without really understanding the material.
4. Before you choose any action, think of the professor standing behind you! You can ask yourself, if s/he was standing there, would you still do what you are planning to do? This is always a good "ethical check" to see if you are upholding professional integrity!

Why are we telling you all of this? Do we think that you are dishonest people or cheaters?

No---we believe that the majority of our students are good people who make bad ethical decisions sometimes when they are:

- Pressed for time
- Pressured by family members and other people to "succeed"
- Focused on the grades rather than the learning
- Doing assignments at the last minute
- Too dependent on other people and the internet for the answers, rather than self-reliant and confident in own ability to do the work

So, although we may not have a campus full of "cheaters," we do seem to have a fairly significant problem on the UCSD campus---students who are willing to take the risk for the grade despite the significant costs they may face if caught. We urge you to consider all of the above before you act so that you do not become one of the 600+ students reported for cheating each year. In the end, it is much easier to explain to a medical, dental, pharmacy, or other professional school why you got that C than why you were disciplined for cheating!

For more information about academic integrity at UCSD, please read the material at

<http://academicintegrity.ucsd.edu>

LEARNING AND UNDERSTANDING THE MATERIAL IN THIS PRIMER AND ON THE WEBSITE (particularly the "Cheating & Consequences" page) WILL BE USEFUL FOR YOUR FIRST READING QUIZ!