

## In 5.310

**“Cheating, plagiarism, unauthorized collaboration, and other forms of academic dishonesty are considered serious offenses for which disciplinary penalties can be imposed” (MIT Bulletin 07/08, page 75)**

### Standards for Academic Honesty

**Expected behavior in the lab courses and the consequences of not following these standards**

Doubtlessly for a society to function as such, it should be based on trust. Decision-making, from seemingly small everyday actions to important political matters, conveys a large component of ethical conduct. Unfortunately, the world is full of examples in which this trust is violated, making it sometimes hard to tell right from wrong. Nevertheless, this trust is sustained by the ethical conduct of each individual.

Every decision has an ethical component. Luckily, in a laboratory course like this one, it's really not difficult to tell right from wrong. The MIT policy on academic misconduct is very strict. "MIT expects that all students come to the Institute for a serious academic purpose and expects them to be responsible individuals who conduct themselves with high standards of honesty and personal conduct. ...Cheating, plagiarism, unauthorized collaboration, and other forms of academic dishonesty are considered serious offenses for which disciplinary penalties can be imposed."<sup>1</sup>

Where does ethical conduct come into the picture? Experimental scientific work requires, among other things, *background knowledge* (why do we want to do the experiment, what do we want to get out of it), *experimental skills* (how do we do it),

*scientific ethics* (what are we going to do with the information we obtain from it, what if the experiment fails, etc.), and a large dose of *motivation* to study, learn, discover, or even to obtain a good grade. Lack of motivation is one of the principal causes of failure in experimental work, especially in a laboratory course. This lack of motivation is usually accompanied by a weak background preparation, an overlook of experimental techniques and procedures, and in several cases, unethical behavior. Motivation is very personal and cannot be provided or taught. On the other hand, the background knowledge you need to perform an experiment is mostly built during your lecture courses. It is in laboratory courses like this one where you learn the experimental skills as well as the basis of ethical scientific behavior.

Unethical scientific behavior can take several forms. "Making up data or results (fabrication), changing or misreporting data or results (falsification), and using the ideas or words of another person without giving appropriate credit (plagiarism), all strike at the heart of the values on which science and society are based."<sup>2</sup> These different forms of unethical scientific conduct have a broad range of consequences depending on the seriousness of the offense. For example, copying a lab report from a classmate or cheating on an exam usually results in failing the class. Publishing forged data in a scientific journal can result in the loss of reputation or even ruin the career of a scientist. Hiding vital information can produce large economic damage or even lead to loss of life. (See "<http://onlineethics.org>." for more information and some important and very interesting case studies.)

Frustration is not a foreign feeling to a student or a scientist. It is not unusual that experiments fail the first time, the second or, sometimes, even the third time they are performed. Occasionally the data collected during an experiment is not as easy to interpret as one would expect, or would like; or the compound from a synthesis doesn't

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<sup>1</sup> "MIT Bulletin 07/08, "Institute Regulations" page 75.

<sup>2</sup> "On Being a Scientist. Responsible Conduct in Research", 2nd. Edition, Committee on Science, Engineering, and Public Policy, NAS, NAE, IOM, National Academy Press, Washington, D.C., 1995.

look like it is supposed to look or doesn't have the properties it is supposed to have. What are the acceptable and unacceptable alternatives in cases like these? It certainly seems easier and less time consuming to copy a lab report from previous years instead of spending a whole weekend on it. It could be tempting to forge or make up data or even copy it from a classmate, instead of investing time repeating an experiment that failed or even admitting that the experiment failed. Someone could argue, "It's just a lab report." Even apparently "minor" gestures like the one described above undermine the foundations of the academic system and should be taken very seriously.

Good scientific behavior is built throughout the formation of a scientist, a doctor, an engineer, or a businessperson. The same applies to the field of health-care, business, engineering, and every aspect of life.

Unlike in the lecture courses, your actions in a laboratory course can affect, and they usually do affect, the performance of your classmates. Imagine that by accident you contaminate a solution of a reagent that your classmates will use after you. Would you inform your TA at the risk of losing your "technique" points? Or would you keep silent and let your classmates perform the experiment with a contaminated reagent?

In some cases unethical behavior seems to be the easy way out, and some students think they can get away with it. That is certainly not the case, and we will do our best in defending the effort of those students who work honestly toward academic excellence.

The Chemistry Department at MIT takes academic integrity very seriously. EACH STUDENT IN 5.310 IS RESPONSIBLE for reading the content of *Academic Integrity at the Massachusetts Institute of Technology: A Handbook for Students*, published by the Office of Dean for Undergraduate Education (<http://web.mit.edu/academicintegrity>).

Violations of Academic Integrity as found on page 4 of the handbook are reproduced below:

**Cheating:**

- copying answers from another student on assignments.
- altering assignments and submitting them for re-grading.
- submitting the same paper for two classes.

**Plagiarism:**

- copying ideas of taking exact wording from published sources without indicating - using quotes or other conventions - where the words came from.
- paraphrasing from sources without indicating where the information came from.
- copying from another student and submitting the work as your own.
- buying a paper or having someone write a paper for you

**Unauthorized Collaboration:**

- collaborating beyond the extent specifically approved by the instructor.

**Facilitating Academic Dishonesty:**

- allowing another student to copy an assignment or problem set that is supposed to be done individually.
- allowing another student to copy answers during the quiz
- completing an assignment for another student.

**HOW THESE VIOLATIONS APPLY TO 5.310****QUIZZES:**

The above violations should be self-explanatory as they apply to the lecture and laboratory quizzes in 5.310.

Only a **simple scientific calculator** is permitted for laboratory quizzes. **No other electronic devices** (including cell phones) are permitted during laboratory quizzes.

The laboratory quizzes are **closed book**. It is a violation to have any written materials (laboratory manuals, textbooks and notebooks) open during quizzes.

### **LABORATORY WORK:**

Experiments are to be carried out using any **pre-lab notes** handwritten in the laboratory notebook and the accompanying Laboratory manual. Having the **laboratory manual in the lab while working on the experiments is allowed** in 5.310 effective with the fall, 2017 semester.

**All experimental work must be performed individually** EXCEPT where specifically stated otherwise (distillation of the essential oil and collection of the data in the kinetics experiment).

**ALL data analysis must be performed individually** even when the data was collected in a team. Spreadsheets containing data or as templates with equations etc. may **NOT** be shared. The only exception is the raw data (time and absorbance) from kinetics runs.

**MAKING UP or ALTERING DATA** is ABSOLUTELY FORBIDDEN. This is the worst violation of academic integrity a scientist can commit.

### **PRE-LABS, POST-LABS and REPORTS:**

**Plagiarism**, using material from other sources - including the laboratory manual - without giving appropriate credit is a violation of academic honesty. The Academic Integrity handbook includes extensive information of what is plagiarism and how to avoid it.

**Copying** into your lab report **any** section of another student's lab report (from the current or a previous semester) is a violation of academic honesty.

Any **use of a "bible"** is a violation of academic honesty.

Adding a grade sheet, data sheet or any other addition to a report that has been submitted for grading is a violation of academic honesty.

**DISCUSSIONS WITH COLLEAGUES:**

**General discussions** with colleagues, teaching assistants, faculty about the experiments, theory behind the experiments, approaches to data analysis and the like **are PERMITTED** and encouraged. Such discussions are an important tool in developing scientific understanding.

**CONSEQUENCES OF VIOLATING ACADEMIC INTEGRITY:**

The consequences of violating academic integrity include **failing (a grade of zero) the assignment or exam, failing the course and referral to the MIT Committee on Discipline (which may lead to suspension or expulsion from the Institute).**

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