The Purpose of Peer Review in Science

First, you need to understand the basics (read this pdf from UC-Berkeley—too simple for you? Then browse through this "Peer Review: The Nuts and Bolts Guide for Early Career Researchers," a great guide put together by a group of young UK scientists interested in science communication—this is a great resource that any student seriously considering a career in science or medicine should examine).

Peer review in science and medicine is:

1. **The gateway to public scientific debate.** Publication of a scientific study is not a stamp of authentication or a guarantee of "Truth." Instead, peer reviews indicating that an article is ready for publication are indicating that the scientific argument is ready to be debated publicly by the scientific community.

2. **The method for establishing minimum requirements for the legitimacy of a scientific study.** Careful peer review ensures that the important aspects of a scientific study have been carefully constructed, conducted, and analyzed. This includes examining background research that places the study in a scientific context, experimental methodology (including methods for data collection and analysis), and careful critique of the methods and results.

3. **The procedure guaranteeing minimum quality of published (and therefore, debatable) information.** In this way, peer review helps authors improve their arguments before entering into the public, scientific debate in addition to rejecting arguments not yet ready for public debate. By helping the authors of a scientific study refine their arguments and presentation, peer review ensures the best possible form of each scientific argument is available to the scientific community, raising the level of scientific argument and ensuring the community does not waste time debating unpolished and inferior (or flawed) studies.

4. **Something that varies from field-to-field and journal-to-journal.** The details of peer review can vary from journal-to-journal and from field-to-field. These details include the timing (length of time between initial submission and final publication), the number of peer reviewers, and the rigor of the review. As a result, some scientific journals are more respected than others in each scientific field and across science as a whole. It is important that each scientist be aware of the journals in his or her field and understand the peer review process used by that journal to prepare articles for publication--this will enable each scientist to determine how to interpret and consider the scientific studies presented in these different journals.

5. **A process that can have drawbacks**—such as a bias against the publication of null results. Scientific studies that do not produce confirmation of a hypothesis or data supporting a theory are extremely common in science. These studies are important in that they help scientists eliminate hypotheses and refine their experimental approaches to a scientific problem. Yet these studies are often not considered favorably in the competition for publication. As a result, groups of scientists spread across the globe may repeat attempts already proved unproductive by their peers, without realizing what their fellow scientists have already learned. There are other drawbacks to peer review as a process, and these can vary from field-to-field, but peer review is still acknowledged as one of the best methods for moderating the public scientific debate.

As a classroom model of some elements of peer review, peer grading of lab reports is an effective tool.
For the lab reports you write in this second semester, your peers will be your graders. Each report will be looked over by approximately four of your classmates (from the section where you completed your report). The section TA acts as the ‘journal editor,’ coordinating and judging the peer reviews (and grades) submitted by your peers for your report. For each lab that you complete, you will be asked to read and grade a lab report written by your fellow classmates. The review that you complete will be combined with the reviews of your peers to determine a fair grade for the report you have reviewed. As an incentive to complete your review in a timely fashion (up to 2 pts.) and with critical but fair judgment (up to 2 pts.), your review of a report can help you earn up to 4 additional points to add to your own lab report score. The work you do in training to engage in peer grading (by practicing on a Lab 6 report done by one of your classmates) will be rewarded by improving your Lab 6 grade.

What we expect you will gain from peer grading:

- A chance to evaluate and improve the scientific arguments of your peers.
- A better grasp of the elements of effective scientific communication, which can help you improve your own work for future lab reports in all of your science courses.

What you will be expected to do as a peer grader:

- Read the report assigned to you thoroughly. (If you are having trouble accessing or re-accessing your report, look at the ELMS announcement for suggestions.)
- Evaluate the thoughtfulness, clarity, persuasiveness, and reflection/prospection of the communication in the report. (The general rubric is here. Specific, tailored rubrics will be added for each individual lab. Please use whichever you are most comfortable with.)
- Critique the scientific argument of the report (including the claims made, the experimental procedure designed, the data collected, the analysis of the data collected, and the conclusions drawn and connections made by the authors).
- Examine the technical accuracy of any analysis conducted and the data displayed in the report (using your own experience in completing this and prior labs).
- Assign scores for the report in the categories provided in the rubric attached to the lab assignment, including brief, constructive comments to accompany/explain your scoring. These comments can be provided in the rubric or in an additional comment box--if comments are included with the rubric, nothing else needs to be written outside the rubric. (Please do not save your rubric comments "for future use," as this makes your comment visible to ALL students on ELMS.)
- Submit these scores/comments via ELMS (and in an email to your TA and the Lead TA: kmoore17@umd.edu) by the deadline.

Your current assignment:

Look through the Lab 6 report that has been assigned to you. Grade it using the "rubric" attached to the Lab 6 assignment. Upload your comments and grade to ELMS (and email a copy to your TA and the Lead TA kmoore17@umd.edu to make sure that your work is not lost or overwritten in ELMS--redundancy can be helpful when trying something new!). Look in your email/ELMS messages for feedback on your peer review--you will receive feedback only if your evaluation is too harsh or too generous, when compared with the TA’s grading of the same Lab 6 report. Get ready to peer-review Labs 7, 9, 10, and 11!
Further Reading

Links:

"Quality and Value: The true purpose of peer review" from Nature Online:
http://www.nature.com/nature/peerreview/debate/nature05032.html

"The Importance and Limitations of Peer Review" from a website on Science-Based Medicine:
https://www.sciencebasedmedicine.org/the-importance-and-limitations-of-peer-review/

"Learning from Peer Review" an article by three Biologists from the online magazine The Scientist: