Criteria for being a successful graduate student in Biology (and becoming employed afterward):

Adapted from Jack C. Schultz (Penn State University) with embellishment by A. K. Knapp, J. Blair and W. Dodds (Kansas State University)

A grad student with a high probability of academic success is one who (not prioritized):

a. is creative and broad-minded. The student integrates different ideas, concepts, and bodies of knowledge, is willing to learn some of the methods and aspects of other disciplines. This allows a student to think creatively about their subject and to collaborate effectively.

b. sets clear research and career goals (after arriving in grad school is ok) and priorities.

c. chooses an area that they are excited about because "It is never wise to seek prominence in a field whose routine chores do not interest you" (E. Wigner). This will help sustain the enthusiasm, optimism and dedication that maximize the likelihood of achieving goals.

d. **realizes that it is scholarship (broadly defined) that earns one a degree**. A successful student acquires the information and skills necessary to achieve their goals **(it's not just credit hours and data collected that earns one a degree, "Students are the sum of their skills and experiences")**.

e. can (or learns to) take the initiative in meeting goals (is willing to get his/her hands/feet dirty) and takes responsibility for meeting goals (doesn't rely on excuses).

f. works consistently towards their goals, not relying upon deadlines to provide impetus to complete each task. Keeping up with professional activities allows for balance in ones professional and personal life, and minimizes times when long hours of work are required (although students should expect some stretches where very long hours are required).

g. becomes productive in the currency needed for meeting career goals (e.g. publishing refereed papers for an academic career).

h. **is task oriented rather than time oriented** (understands that science is a career not an hourly job).

i. works well with others and in teams.

j. **is devoted to excellence in communication** (including teaching, professional and general public presentations).

k. understands the competition he/she is facing. There is someone else out there who is just as good as you are at all the above, wants the same job, and does little else with their time but pursue their goal.

Further Advice and "Professional" suggestions for success as a Grad Student and beyond:

a. Be in your office/lab or the building from 8-5 M-F...or leave a note on your door indicating where you are. This is the **minimum** # of hours you should be working. View grad school from the prospective of professional development (as a salaried, not hourly job) ...not as an undergraduate student... There is always something you can be doing...even if you're "brain-dead"....scan the literature...read an edited volume...wash your lab dishes.

b. Set goals (see below) and have the self-discipline to enforce deadlines...even if it means staying late to meet a self-imposed deadline!

c. Become a "Science Nerd"...scan journal contents, subscribe at the library for specialized searches using keywords and obtain the results by e-mail, go to journal websites and subscribe free to receive free ToCs (Tables of Contents), go to seminars just because, participate in journal club, help other students with their side projects.

d. Collect as much relevant old literature as you can....some labs provide a copy card for free (to you)...use it! Start a personal literature and reprint database (e.g., EndNote or ProCite). Start this early! If your advisor has an electronic database, appropriate it as yours and add to that.

e. Plan your research and your dissertation/thesis in detail. Make sure it is question/hypothesis driven. Have proposed Chapter titles and a rough outline done ASAP...For any research project, sketch the graphs/tables you will produce before you make any measurements....if you know what will be on the x and y axis...you will know what experiments to set up and what to measure! Give your advisor and committee a copy of the prospectus for your thesis/dissertation ASAP. Meet with your committee early and at least once/year to get insight on your research from other committee members.

f. Justify your research scientifically in the broadest terms possible (i.e. what "big questions" does your research address... don't rely on "Because it hasn't been done before" or "We don't know anything about this").

g. After you collect data...as quickly as possible, reduce it, initially analyze it and graph it...Graph is the key here. All too often we find statistical significance but then graph the data and find its because of one (or few) points. Results are one of the most rewarding parts of science and positive feedback for your efforts...as well as guides for "mid-experiment adjustments" that can be made.

h. Everyone needs vacations... but don't take them during key research times (e.g. during a critical part of the field season or when you know another lab is hot on your topic).

i. Plan each experiment carefully before performing it. Plan its design, make sure you have all the reagents, and make sure that you include positive and negative controls.

Goals to set to be successful:

a. **Publish lots of papers**! Long and short, in top journals and regional journals, as first author and as 2^{nd}-9^{th} author! Published papers are ***the currency*** that others will measure you with. Quality and quantity are very important.

b. How many papers is "lots"? It varies between fields. In Ecology, at least 2 for your MS (preferably both first authored)....and 5 at the end of your PhD. Ten or more is better (half should be first authored by you, but collaborate with others to publish papers on which you are a co-author!). In the molecular fields, a minimum of 1 for MS and 2 for PhD is more common. Still, the more the better. That may seem like a lot...but it's a worthwhile goal.

c. Once you start publishing, have no "0" paper years...show a consistent ability to be productive...this requires long-term planning...it takes 12-24 months for a journal to publish your work. If you can't be consistently productive as a student whose professional time is dedicated primarily to research, what will happen when you are an assistant professor with new courses to develop, committees to serve on and proposals to write?

d. **Present your research results at professional meetings and elsewhere every year if possible**...Posters are fine, but talks are better! This is how people learn of you (and how you get jobs...).

e. Give enthusiastic talks! If you can't get excited about your research, who else will? You should have your talk practiced, timed and polished before you leave for the meeting...giving a bad talk will undo years of reputation-building doing good science! People remember two types of talks...really good ones...and truly bad ones.

f. Be an ambassador for your research and the graduate program at your university ...the value of your degree will increase if the reputation of your school is enhanced. When at national meetings or when visiting with other grad students or scientists, don't whine and complain (even though you may have good reason to do so) about your university or the town it is in. When prospective faculty members, seminar speakers, postdocs, or graduate students interview, talk up the strengths of the Division.

g. **Don’t ever lie about your data or your study**...but salesmanship is very important in this field...if you want to sell a car, you don’t make a big deal that the tires are worn...hit the high points, point out that the engine has low miles! Learning to do this will help you publish and get your research funded.