

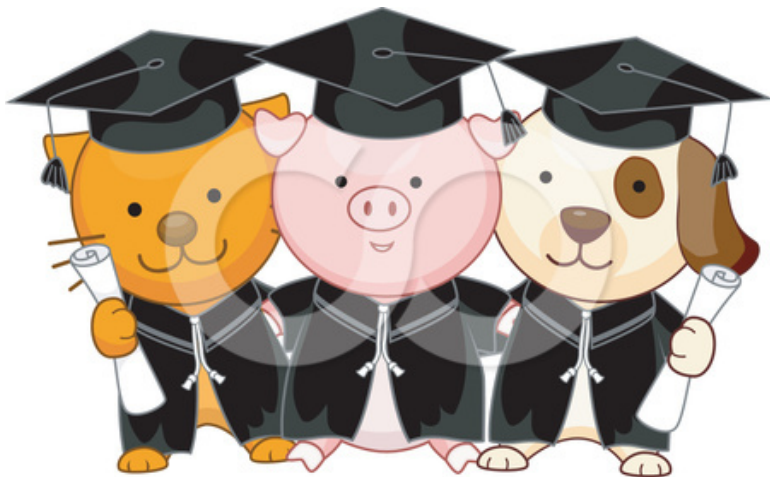
How to become a successful graduate student?

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March, 2012

Graduate students



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Being a Graduate Student

Becoming a successful graduate student is very important for your future career.

- You should think ahead and have a good plan, since the real world will be very competitive.
- **Focus on the most important. Don't major in minor stuffs.**
- When you look back in the future, there should be no regret.

What is important?

First things

In general, the following are important

- Academic preparation
- Communication skills: both oral and written
- Computer and software skills
- Attitude, hard-working, proactive, independence
- Good references

What is your ultimate goal?

What is important to you also depends on your ultimate goal

- a M.Sc degree?
- a Ph.D degree?
- Academic job or industrial job?
- Career goals?

What is important?

If you just want an industrial job (M.Sc or Ph.D), you should probably focus more on

- broad statistical knowledge
- excellent communication skills (the ability to explain statistical concepts, methods, and results to non-statisticians)
- excellent computer and software skills
- good people skills

What is important?

If you just want an academic job (Ph.D or postdoc), you should probably focus more on

- research skills, publications
- communication skills
- teaching skills
- independence

Attitude

Attitude

Attitude is most important! Attitude determines your destiny.

- Be willing to learn and work hard.
- Be proactive. Take initiative to do things without being told.
- Be independent. Don't rely too much on your supervisor to teach you everything.
- Be humble. You still have a lot to learn.

Put First Thing First

First thing first

Put first thing first. That is, don't major in minor stuffs.

- Focus on the most important stuffs in your life.
- Don't spend too much time on minor stuffs.
- **Action is what produce results. Results are what matter.**
- Know what you should do. Don't be influenced by other people.

Academic Preparation

- Understand important statistical concepts and methods
- For a statistical method, focus on the **main ideas, assumptions, and applicability.**
- Don't be too distracted by technical details, unless you want to do research on this problem.
- A broad knowledge of statistical methods.

Work hard

Work hard, read widely!

Communication Skills

Communication Skills

Communication skills mean both oral and written communication skills.

- Ability to explain statistical concepts and methods to non-statisticians in simple language
- Ability to write clearly and logically
- Pay close attention to how experts talk and write

Practice

Practice, practice, practice!

Computer Skills

- Software skills: R, SAS, etc
- Programming skills: programming in R, C, FORTRAN, etc
- Write good code: **efficient, general, easy-to-understand**

R

Can you write a good R package?

References

Good reference

Strong reference letters are very important for you: either when you apply for a school or look for a job.

- People are fully aware of your attitude and performance.
Have a good beginning of your graduate study!
- Don't wait until last minute to realize the importance of reference letters. It's too late!
- Letter writers should know you well so that they have something concrete to say.

Being a Statistician

Statistical methods

Good understanding of statistical concepts and methods is important.

For example, can you explain the following statistical concepts to non-statisticians?

- p-value
- bootstrap
- MCMC methods

Being a Statistician

Statistical methods

Each statistical method has its assumptions, limitations, advantages, and applicability. Be clear about these, and know when and how to use the method.

For example, can you explain the following statistical methods to non-statisticians?

- Semiparametric methods
- Bayesian methods
- Robust methods

People Skills

People skills

People skills are important life skills. Try to understand human nature.

- Human beings are not machines – they have feelings, emotions, and different views.
- Know what other people think and need.
- Everyone thinks differently. Don't assume other people think as you do.
- Think win-win. Be co-operative.

Research Skills

Research

An important research skill is to be able to read and understand research articles from statistical journals.

- Read more research papers
- Focus on the main ideas in the paper, rather than the technical details
- **What is the paper about? What is new in the paper?**
- Can the methods in the paper be improved?

Research Skills

Another important research skill is the ability to implement a statistical method. This requires good programming skills.

Many modern statistical methods are computational intensive methods (e.g., a MCMC method or a Monte Carlo EM algorithm). So it's best to combine R with C or Fortran, since R alone is too slow.

Applied Statistics Skills

Applied skills

Data analysis skills are important for both research and industrial positions. Given a dataset, how to choose appropriate statistical methods?

- **Descriptive analysis:** numerical and graphical methods (e.g., mean, SD, boxplot).
- **Confirmatory analysis:** statistical modelling and inference.
- Use at least two methods to analyze the same dataset and compare the results.

Applied Statistics Skills

Applied skills

Statisticians need to help subject-area researchers to design studies to collect data. It is an important first step.

- Design of the study: sampling, randomization, blinding, controls, etc.
- Sample size calculation

**No statistical methods can fix poorly collected data.
So, carefully design the study!**

Statistics Consulting

Consulting

The ability to work with non-statisticians is an important skills for statisticians.

- Explain statistical concepts and methods in simple language understandable by non-statisticians. For example, what a p-value means? What is a nonparametric method and why use it? Why do we perform both univariate analysis and multivariate/regression analysis? etc
- Explain and interpret results from software.
- How reliable are the analysis results in a particular application.

**Subject-area researchers want to know what a statistical method is about and why it gives reliable answers.
Can you explain it?**

Can you explain any statistical concepts and methods without using mathematical formulas?

What do to if the study is poorly designed, the data are poorly collected, and there are lots of missing data or dropouts?

Writing a Report or Thesis

Writing

Writing is a very important communication skills!

- Organize your materials logically: what to write first, what to write next.
- Think about the readers. Don't assume readers understand what you are thinking. Explain everything you write.
- Give justifications for important statements. Cite references.
- Use “is” or “may be”? Use “a” or “the”? These are important!

Writing a Report or Thesis

Writing

Use good pictures. A picture is worth a thousand words!

- Start with background and motivation. Explain why the problem is important.
- Give concrete examples to justify your statements. Not just “it’s important ...”. Explain why.
- Keep focused. Be concise without omitting important materials.

Writing a Report or Thesis

- Figures and tables should be selective. Not too many, not too few.
- Emphasize the key messages.
- Avoid obvious typos and grammar errors. (Don't give readers impression that you are sloppy!)

Revise!

Revise, revise, revise!

Giving a Good Talk

Talk

A good talk is very important for your job interview!

- Design slides carefully.
- Less is more. Not too much materials on a single slide!
- Focus on the main points.
- Avoid too much technical details.

Giving a Good Talk

- Use good pictures.
- Answer questions politely and concisely. Don't be stopped by questions for too long.
- Be enthusiastic about your talk.
- Begin with something simple (so most people can understand).

Time

Watch your clock. End on time. Don't delay!

Want to do a Ph.D?

- Doing a Ph.D requires a big commitment on time and energy.
- Build good research skills.
- Choose a suitable supervisor.
- Choose an appropriate thesis topic.
- Try to finish on time. Doing a Ph.D for eight years looks bad!

Career Opportunities

Statisticians can work almost anywhere

- universities: faculty, statisticians
- drug companies, hospitals, health-research institutes (e.g. Cancer center)
- banks, insurance companies, financial institutes
- Goggle, Microsoft, Boeing,

New York Times, 2009

“For Today’s Graduate, Just One Word: Statistics”

Thanks!

Thank you very much for listening!

Any questions?