

# Steps to Graduate Student Success

by Naomi J. Halas

The following is a list of essential skills that all successful researchers have developed. Without these skills, you cannot expect to succeed in research. The extent to which you develop the ability to perform in all these areas establishes a good foundation that will prepare you for the rest of your research career and will lead directly to research success. The responsibility for the development of these skills is entirely your own. Your research advisor can provide guidance and assistance in these areas, but your graduate education is your personal responsibility. This list is meant to be a personal barometer for you to analyze your own strong and weak areas.

- **Work:** Develop a sense of urgency and the habit of working hard at solving laboratory problems: execute a project, master experimental difficulties, debug an experiment.
- **Think:** Understand, explain and interpret your data, learn how to perform numerical data analysis, construct theoretical models to explain your data.
- **Read:** Investigate your project, learn its history and context, understand its technical foundation and background. Learn to read scientific papers with a critical eye, and with the expectation of being able to duplicate what is described in the article. Follow your field by reading current journals. Know who just did what in your field, as well as related areas.
- **Write:** Write a concise and focused scientific paper; write a larger and more comprehensive document (thesis). Learn word processing and text formatting appropriate for scientific documents.
- **Speak:** Discuss your ongoing research with peers, colleagues and visitors in an informal setting and at conferences; cultivate professional contacts and associations. Learn how to make a well-organized and coherent presentation of your research results in front of an audience.
- **Manage:** Time: develop a sense of how long any specific task will take you to execute. People: develop successful, working relationships with those who work with you, for you, and those you work for.
- **Contemplate:** Design "next" experiments, both incremental and long-term, learn to write a successful research proposal. Keep track of research ideas, perhaps in the form of a research diary; learn to be able to judge when an idea is feasible and when a research direction is important or impacting.