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# The APS Professional Development Resource Guide

## 2007 Edition


*Edited by*

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**APS Committee on Careers and Professional Development**

**One Physics Ellipse, College Park, MD**

# The APS Professional Development Resource Guide: 2007 Edition

**Chapters**

## INTRODUCTION

This document presents the first ***Professional Development Resource Guide*** that lists resources identified as important for the professional development of today's scientists. This list is organized into ten chapters that represent steps that a scientist can take to improve their professional development while working concurrently on a technical project, which may include but is not limited to working on a PhD, completing a thesis, or working on a career. The ten steps have been identified by members of the APS Committee on Careers and Professional Development (CCPD). Interested readers are welcome to submit additional resources to be included in future editions.

In today's career environment, there are many types of employment opportunities and career choices available to scientists. Common to each of the many career choices are skills that are important to achieve success in a job. Typically, many of these skills are non-technical and are not part of a standard academic curriculum. Furthermore, each scientist is responsible for his or her own career development. Although many resources have been written to provide advice on this topic, the resources have been written at various times and exist in different publications, such as books, newsletters, magazines, and the internet. The purpose of this ***Guide*** is to assemble existing resources into one reference guide with a simple format.

Thus, by its nature, this guide presents material compiled across many disciplines and sources beyond those covered directly by the American Physical Society. The APS Committee on Careers and Professional Development believes these are valuable references for consideration, albeit without specifically endorsing the views presented. We thank the APS Executive Officer, Judy Franz, for her comments and support of this document.

# Chapter 1
# FOLLOW CURRENT EVENTS

An important step in the professional development of a scientist is the ability to articulate the importance of their work. Specifically, many scientists need to describe their work during annual reviews (industry, academia), tenure reviews (academia), and grant proposals (government, academia, industry). While typically this description may involve applications to other scientific fields, it may also have applications in other areas such as engineering, government, business, and medicine. As a result, it is important to be proactive and take steps to follow current events. Many of the links in this chapter have been presented as part of the 2005 IEEE Spectrum Magazine's Career Accelerator Forum on September 20, 2005, in a talk entitled, "How to Keep Your Technical Chops in Fast-Changing Fields." The purpose of this chapter is to provide free available resources in these areas.

## 1. Follow Current Events

a. Know how the Physics is used
   - **i.** http://www.howstuffworks.com

b. Physics and Nanotechnology
   - **i.** Physical Review Focus
     1. http://focus.aps.org
     2. owner-focus@lists.apsmsgs.org (weekly email)
   - **ii.** American Institute of Physics
     1. physnews@aip.org (weekly email)
   - **iii.** ***Science News*** (weekly magazine with annual subscription)
   - **iv.** Albany Nanotech and Solid State Technology Magazine
     1. ELevine@uamail.albany.edu
     2. 518-437-8623
     3. http://www.albanynanotech.org

c. Materials Science
   - **i.** MRS Bulletin Table of Contents Alert
   - **ii.** enews@lucy.mrs.org (monthly email)

d. Optics
   - **i.** ***Photonics Spectrum*** (monthly free magazine)

e. Academia

- **i.** INSIDE HIGHER ED
    1. newsroom@insidehighered.com
    2. http://insidehighered.com

f. Government
- **i.** AIP Bulletin of Science Policy News (in Washington, DC)
    1. http://www.aip.org/fyi
    2. http://www.aip.org/fyi/subfyi.html
- **ii.** Grants.gov Opportunities Postings
    1. notifier@fedgrants.gov
- **iii.** US Department of Health and Human Services – National Institutes of Health
    1. olib@OD.NIH.GOV
- **iv.** What's New @ IEEE-USA
    1. IEEE-USA's Eye on Washington: Erica Wissolik, IEEE-USA
        a. 1828 L Street, N.W. Suite 1202
        b. Washington, DC 20036-5104
        c. e.wissolik@ieee.org
    2. http://whatsnew.ieee.org
    3. http://www.ieeeusa.org/emailupdates

g. Engineering
- **i.** IEEE Career Alert
    1. ieee-career-alert@ieee.org
- **ii.** IEEE-USA Today's Engineer
    1. ieee-enotice@ieee.org (email update)
- **iii.** What's New @ IEEE
    1. whatsnewadmin@ieee.org
- ***iv.*** ***Electronic News***
    1. http://reed-electronics.com/electronicnews
- ***v.*** ***EETimes***
    1. http://www.eetimes.com
- ***vi.*** ***Silicon Strategies***
    ***1.*** http://www.siliconstrategies.com
- ***vii.*** ***Test and Measurement World Magazine***
    ***1.*** tmworld@email.tmworld.com
    ***2.*** http://www.reed-electronics.com/tmworld/
- **viii.** ***IEEE Spectrum*** webcasts
    1. http://www.spectrum.ieee.org/webcasts
- **ix.** ***IEEE TV – interviews***
    1. http://www.ieee.org/ieeetv

x. ***IEEE Career Advancement Forum***
   1. http://ieee.unisfair.com/productsServlet?command=product_update&next_page=ProductEdit.jsp&product_id=61&eid=75

h. Industry
   **i.** Electronic News Today
      1. ElectronicNews@email.electronicnews.com
      2. http://www.ElectronicNews.com
      3. http://www.EETimes.com
   **ii.** Semiconductor International Weekly
      1. SIWeekly@email.semiconductor.net
      2. http://www.semiconductor.net
      3. semiconductor_international@email.semiconductor.net

i. Medicine
   **i.** Harvard Medical School weekly email newsletter
   **ii.** HEALTHbeat@hms.harvard.edu

j. Business
   **i.** Harvard Business Review online
   **ii.** Harvard_Business_Online@hbsp.ed10.net
   **iii.** New York Times http://www.nytimes.com

# Chapter 2
# LEARN BASIC SKILLS

A second important step in the professional development of a scientist is the ability to learn basic non-technical skills. Typically these skills may involve an increasing use of the computer and the ability to interact remotely with people. Specifically, many scientists need to interact with colleagues who are no longer present in adjacent offices or down the hall. Instead, many colleagues are working at remote sites or are traveling, and the communication among colleagues is performed through writing (email) and teleconferences. For these forms of communication, the skills of writing and speech etiquette need to be adapted to the changing work environment in order to maximize the success in their jobs. The purpose of this chapter is to provide free available resources in these areas.

## 2. Learn Basic Skills

a. UNIX/AIX. Windows.

b. Willingness to learn new basic skills
   - **i.** Read "Good Writing and Speech – Their Importance to the Engineer," by Alfred N. Goldsmith. http://www.ieeepcs.org/pdfs/nov_dec04.pdf. IEEE PCS Newsletter, Vol. 48, No. 6, p. 26.
   - **ii.** Read "An Abuse of Engineeringese Was Observed," by Jean-Luc Doumont. http://www.ieeepcs.org/pdfs/sep_oct04.pdf. IEEE PCS Newsletter, Vol. 48, No. 5, p. 8.

c. Email etiquette
   - **i.** Read "Say What You Mean in E-mail," by Professor Grammar. http://www.ieeepcs.org/pdfs/mar_apr02.pdf. IEEE PCS Newsletter, Vol. 46, No. 2, p. 22.

d. Phone etiquette
   - **i.** "Hello, this is John Smith calling for Dr. Physics. I am following up on the letter that I sent a few days ago. Is this a good time to speak?"

e. How to write
   - **i.** Read "Be in the Business of Good Writing," by Harvey Mackay. http://www.ieeepcs.org/pdfs/jul_aug01.pdf. IEEE PCS Newsletter, Vol. 45, No. 4, pp. 1, 5.
   - **ii.** Read "Woe is the Dangling Phrase," by Professor Grammar. http://www.ieeepcs.org/pdfs/jan_feb02.pdf. IEEE PCS Newsletter, Vol. 46, No. 1, p. 12-13.
   - **iii.** Read "Tips for Making Writing Easier: Part 1: The Five-Minute Miracle," by Cheryl and Peter Reimold. http://www.ieeepcs.org/pdfs/mar_apr03.pdf. IEEE PCS Newsletter, Vol. 47, No. 2, pp. 13-14.
   - **iv.** Read "Tips for Making Writing Easier: Part 2: Narrow Your Questions, Shape Your Answers," by Cheryl and Peter Reimold. http://www.ieeepcs.org/pdfs/may_jun03.pdf. IEEE PCS Newsletter, Vol. 47, No. 3, pp. 10, 14.
   - **v.** Read "Tips for Making Writing Easier: Part 3: Focus on Your Key Message," by Cheryl and Peter Reimold. http://www.ieeepcs.org/pdfs/jul_aug03.pdf. IEEE PCS Newsletter, Vol. 47, No. 4, p. 10.
   - **vi.** Read "Tips for Making Writing Easier: Part 4: Break Out of the Endless Editing Cycle," by Cheryl and Peter Reimold. http://www.ieeepcs.org/pdfs/sep_oct03.pdf. IEEE PCS Newsletter, Vol. 47, No. 5, pp. 11, 13.
   - **vii.** Read "Tips for Making Writing Easier: Part 5: Quick Editing for Organization," by Cheryl and Peter Reimold. http://www.ieeepcs.org/pdfs/nov_dec03.pdf. IEEE PCS Newsletter, Vol. 47, No. 6, pp. 9-10.
   - **viii.** Read "Tips for Making Writing Easier: Part 6: Toning Your First Draft Up – Or Down," by Cheryl and Peter Reimold. http://www.ieeepcs.org/pdfs/jan_feb04.pdf. IEEE PCS Newsletter, Vol. 48, No. 1, pp. 8-9.
   - **ix.** Read "How Should Engineers Write? What Their Managers Say," by Kathleen Mohn, http://www.ieeepcs.org/pdfs/mar_apr02.pdf. IEEE PCS Newsletter, Vol. 46, No. 2, pp. 1, 5-6.
   - **x.** Read "How to Write Readable Reports and Winning Proposals. Part 1: Grab Your Reader with a PAW," by Peter and Cheryl Reimold, http://www.ieeepcs.org/pdfs/may_jun02.pdf. IEEE PCS Newsletter, Vol. 46, No. 2, pp. 10-11.
   - **xi.** Read "How to Write Readable Reports and Winning Proposals. Part 2: Structure Your Reports to Please Your Reader," by Peter and Cheryl Reimold, http://www.ieeepcs.org/pdfs/jul_aug02.pdf. IEEE PCS Newsletter, Vol. 46, No. 4, pp. 15-16.

**xii.** Read "How to Write Readable Reports and Winning Proposals. Part 3: Save Readers and Yourself Precious Time," by Peter and Cheryl Reimold, http://www.ieeepcs.org/pdfs/sep_oct02.pdf. IEEE PCS Newsletter, Vol. 46, No. 5, pp. 1, 4.

**xiii.** Read "How to Write Readable Reports and Winning Proposals. Part 4: Internal Proposals that Move Decision Makers," by Peter and Cheryl Reimold, http://www.ieeepcs.org/pdfs/nov_dec02.pdf. IEEE PCS Newsletter, Vol. 46, No. 6, pp. 14, 16.

**xiv.** Read "How to Write Readable Reports and Winning Proposals. Part 5: Persuasive External Proposals," by Peter and Cheryl Reimold, http://www.ieeepcs.org/pdfs/jan_feb03.pdf. IEEE PCS Newsletter, Vol. 47, No. 1, p. 8.

f. Learn to communicate

**i.** Read "Communication in the New Millennium," Cheryl and Peter Reimold. http://www.ieeepcs.org/pdfs/may_jun00.pdf IEEE PCS Newsletter, Vol. 44, No. 3, May/June 2000, pp. 5-6.

**ii.** Read "Words that Work: It's Not What You Say, It's What People Hear". http://www.amazon.com/Words-That-Work-What-People/dp/1401302599

g. Microsoft Office Suite. Latex. Adobe acrobat. Spreadsheet programs – Excel, OriginLab.

# GIVE PRESENTATIONS

Another important step in the professional development of a scientist is the ability to give good presentations. Typically scientists are working on their technical projects until a deadline (conference deadline or proposal deadline) and put the presentation of the material together at the last minute. While this may be an efficient use of time in the lab, the actual language used in the oral component of the presentation may suffer. Specifically, when a presentation is assembled at the last minute, the scientist spends little time structuring the thoughts that will be used to engage the audience and describe the importance of the scientific work itself. The purpose of this chapter is to provide free available resources in these areas.

## 3. Give Presentations

a. Describe the conclusions in 1-2 minutes at the beginning of your talk

b. Practice! Practice!

c. Read "A 12-Step Program For Running Meetings," by James T. Heires. http://www.ieeepcs.org/pdfs/may_jun00.pdf. IEEE PCS Newsletter, Vol. 44, No. 3, May/June 2000, pp. 21-22.

d. Read "Developing Effective Presenters I: Tips for Managers," by Jason Palmeri and Paul Tuten. http://www.ieeepcs.org/pdfs/nov_dec03.pdf. IEEE PCS Newsletter, Vol. 47, No. 6, pp. 12-13.

e. Read "The Twists and Turns of Effective Presentations," by Jason Palmeri and Paul Tuten. http://www.ieeepcs.org/pdfs/mar_apr03.pdf. IEEE PCS Newsletter, Vol. 47, No. 2, pp. 16, 18.

f. Read "How to Give Technical Presentations to Non-Technical Audiences: Part 1: Five Ways to Beat Stage Fright," by Cheryl and Peter Reimold. http://www.ieeepcs.org/pdfs/may_jun04.pdf. IEEE PCS Newsletter, Vol. 48, No. 2, pp. 14-15.

g. Read "How to Give Technical Presentations to Non-Technical Audiences: Part 2: Pitfalls in Preparation," by Cheryl and Peter

Reimold. http://www.ieeepcs.org/pdfs/may_jun04.pdf. IEEE PCS Newsletter, Vol. 48, No. 3, p. 14.

h. Read “How to Give Technical Presentations to Non-Technical Audiences: Part 3: Magic Questions,” by Cheryl and Peter Reimold. http://www.ieeepcs.org/pdfs/jul_aug04.pdf. IEEE PCS Newsletter, Vol. 48, No. 4, pp. 5, 11.

i. Read “How to Give Technical Presentations to Non-Technical Audiences: Part 4: Telling the Story in Their Language,” by Cheryl and Peter Reimold. http://www.ieeepcs.org/pdfs/sep_oct04.pdf. IEEE PCS Newsletter, Vol. 48, No. 5, p. 9.

j. Read “How to Give Technical Presentations to Non-Technical Audiences: Part 5: A Fail-Safe Structure for Your Ideas,” by Cheryl and Peter Reimold. http://www.ieeepcs.org/pdfs/nov_dec04.pdf. IEEE PCS Newsletter, Vol. 48, No. 6, pp. 5-7.

# PREPARE A WELL-THOUGHT-OUT CV

Throughout the professional development of a scientist it is important to be able to prepare a well-thought-out resume or curriculum vitae (CV). Here we emphasize that there is no one-size-fits-all CV. Instead, a scientist needs to be proactive to find out which type of CV is suitable for the position for which they are applying, and then take the time to modify the CV to accommodate the job requirements. A sloppy CV is often the first written document that an employer will see from a job applicant, and it is important to take steps to give a good impression. A corollary to this point is the 30-second description of one's work that a scientist needs to have on the tip of his or her tongue in the not-so-rare case that someone asks "What do you do?" For this question, it is important to be able to assess the expertise of the person asking the question and then to provide a concise answer that *that person specifically* will understand. The purpose of this chapter is to provide free available resources in these areas.

## 4. Prepare a Well-Thought-Out CV

a. "I believe in punctuality, though it makes me very lonely," *E. V. Lucas.*
b. Develop a one-sentence description of your work
c. 30-second description of your work
d. Develop a simple explanation of what you do (for non-experts)
e. CV template (see below)
f. Read ***Landing Your First Job: A Guide for Physics Students***, by John S. Rigden, 2002, Springer, 110 pages, Softcover. ISBN: 0-7354-0080-6. http://www.springer.com/sgw/cda/frontpage/0,11855,4-102-22-8894770-0,00.html?changeHeader=true
g. Read „The Challenging Field of Engineering Writing and Speech," by John R. Pierce, *IEEE Professional Communications Society Newsletter*, vol. 48, No. 6, pp. 27-28. http://www.ieeepcs.org/pdfs/nov_dec04.pdf
h. Read "A Woman Physicist's Guide to Speaking," ***Physics Today***, February 2005, p. 54. http://www.physicstoday.org/vol-58/iss-2/p54.html
i. Read "Arrogance – A Dangerous Weapon of the Physics Trade?" by J. Murray Gibson, ***Physics Today***. Vol. 56, p. 54. http://www.physicstoday.org/pt/vol-56/iss-2/p54.html

## CV Template

**JOHN J. DOE, Ph.D.**
Senior Member of the IEEE

### Work address

Physics Department
University of Physics
Physics Road
Physics Town, CA 95101 USA

Phone: (999) 999-9999
FAX: (999) 999-9998
jjdoe@universityphysics.edu
http://www.universityphysics.edu/jjdoe

### Current research interests

Quantum effects in two-dimensional electron gases.

### Additional research interests

- Low temperature physics
- High-temperature superconductivity

### Education

PHYSICS UNIVERSITY, Town, CA — Aug. 2000 – Sept. 2005
*Ph. D. in Physics*, June 2005 (GPA = 3.8/4.0; 4.0 = A)
Ph. D Thesis Title: "Quantum effects in two-dimensional electron gases"
Advisor: Prof. Advisor, Physics Department

PHYSICS COLLEGE, Physics Town, CA — Sept. 1995 - June 2000
*A.B. in Physics,* June 2000 (GPA = 3.5/4.0; 4.0 = A)
Honors: *Cum Laude*

### Appointments and elected positions

SOCIETY OF PHYSICS STUDENTS (SPS)
*Member of SPS* — Sept. 1996 – June 2000

### Work experience summary

PHYSICS UNIVERSITY, Town, CA
*Graduate Research Assistant* — Aug. 2000 – Sept. 2005
Measured quantum effects in two-dimensional electron gases

COMPANY LAB, Company Town, CA
*Consultant in the Field of Two-Dimensional Electron Gases* — June – Aug. 1999
Designed and prepared specimens for precision measurements.

### Work experience

PHYSICS UNIVERSITY, Town, CA
*Graduate Research Assistant* — Aug. 2000 – Sept. 2005
Measured quantum effects in two-dimensional electron gases

- Developed measurement techniques
- Measured quantum effects in two-dimensional electron gases

COMPANY LAB, Company Town, CA
*Consultant in the Field of Two-Dimensional Electron Gases* — June – Aug. 1999
Designed and prepared specimens for precision measurements

- Designed specialized specimens with two-dimensional electron gases
- Measured quantum effects in numerous specimens
- Discovered two new quantum effects in these specimens and verified with theory

### Short courses

Advanced Programming Language, Company, Company Town, CA — Sept., 2005

Operation of Machine Tools, Physics University, Town, C 2001

## Skills

- Windows, UNIX Operating Systems
- Languages: French (basic knowledge)

## Committees and technical duties

PHYSICS CONFERENCE, Town, CA

*Session Chair*

2005

PHYSICS JOURNAL, Town, CA
*Technical reviewer* 2003

## Recognition and honors

PEER RECOGNITION
Senior Member of the IEEE Elected January, 2015

EMPLOYMENT RECOGNITION
*Two Awards* 2015

GRADUATE RECOGNITION
*Graduate Student Travel Grants* 2000, 2001
Awarding Institution: Physics University, Town, CA

## Keynote speaker

**April 23, 2005**
**"Keynote Speech"**
Physics University, Town, CA

## Invited talks

1. "Title," Physics University, Town, CA July 2, 2001
   Department of Physics

## Publications in refereed journals

1. A. Advisor and **J. J. Doe**, "Title," *Journal* 340, 128 (1999).

## University Technical Research Reports

1. **J. J. Doe**, A. Advisor, "Title," *Research Report. R6*, Jan. 20, 2005.

## Conference and workshop publications

1. A. Advisor and **J. J. Doe**, "Title," in Proc. Physics Workshop, 1999.

## Conference and workshop presentations

1. "Graduate study in Physics," **J. J. Doe**. *Presentation to the Physics University Committee*, Town, CA. April 1992. *Panel Member*.

## Patents

1. *Issued* "Title," A. Advisor, **J. J. Doe**. *US Patent No. 6,666,666*. Date of Patent: Sept. 30, 2013.

2. *Filed* "Title," A. Advisor and **J. J. Doe**. Filed Dec. 1, 2013.

## Presentations at University workshops, including:

1. "Title," **J. J. Doe**, A. Advisor, University Physics Group, Town, CA, April 17, 2012.

## Teaching and student supervision

PHYSICS UNIVERSITY, Town, CA
*Teaching Assistant, Physics 2* Aug. – Dec. 2004
Taught review and weekly sections for a second-year course, “Physics”
Instructor: Prof. Physics

**External presentations to Other Universities**

1. “Title,” **J. J. Doe**, A. Advisor, Quarterly Review, Town, CA, April 30, 2013.

**Society memberships**

Institute of Electrical and Electronics Engineers (IEEE)
American Physical Society

**References Available On Request**

## Chapter 5
## DON’T PROCRASTINATE

Here I think the title says it all. A scientist needs to understand that his or her work fits into a larger overall context of scientific work, and that it is important to complete their own work while it is still relevant to scientific progress (that is, before someone else does it).

### 5. Don't Procrastinate

a. Do experiments. If it can be done today, do it.
b. Don't spend more time than necessary writing the thesis
c. Know how to write a paper. Write papers!
    - **i.** Read "Indeed!" by Jean-Luc Doumont. http://www.ieeepcs.org/pdfs/sep_oct01.pdf. IEEE PCS Newsletter, Vol. 45, No. 5, p. 13.

## Chapter 6
## SET GOALS

It is important to distinguish the activity of the paper-writing, proposal-writing, and thesis-writing as distinct from the goals themselves. That is, writing a paper is not the goal itself. Rather the goal, for example, may be the understanding of some new scientific process or some engineering apparatus. The papers are simply milestones or road markers along the way that are prepared in order to chart the progress. It is important not to confuse these approaches and to set appropriate goals. In this very brief chapter we propose several goal horizons.

**6. Set Goals**

a. “Nothing so conclusively proves a man’s ability to lead others as what he does from day to day to lead himself,” *Thomas J. Watson*.
b. Today’s goals. Write them down.
c. Tomorrow’s goals
d. This year’s goals
e. 5-year goals
f. 10-year goals
g. Retirement goals……

## Chapter 7
## IDENTIFY POTENTIAL EMPLOYERS AND RELEVANT JOBS

Another important step in the professional development of a scientist is the ability to identify potential employers and relevant jobs for which they are qualified. For example, in the case of a student working on the PhD, this step is ideally not left until the last year prior to graduation. Another way of putting this point is that the student should find out for himself or herself where he or she might be employed before studying for several years in an area with limited job prospects. The purpose of this chapter is to provide a preliminary list of types of jobs available in industry and government.

## 7. Identify Potential Employers and Relevant Jobs

a. Consult the APS Career Center
   - **i.** http://careers.aps.org

b. Knock 'em Dead 2007: The Ultimate Job Search Guide
   - **i.** ISBN: 1593377053
   - **ii.** http://www.bestwebbuys.com/books/compare/isbn/1593377053

c. See the companies in the list below. **Look at these sites to see job descriptions and required skills to see how well your skills match available job postings. Take action if you do not identify any available jobs for your skill set.**

**d. Academic Jobs**

   - **i.** Look at individual job postings on university and college websites
   - **ii.** Network at conferences
   - **iii.** Read the pages of each monthly issue of ***Physics Today***

e. **Industry Jobs (selected companies)**

Read "Educating Physicists for Industry: The Rest of the Story," by Kenneth C. Hass. http://www.physicstoday.org/pt/vol-55/iss-12/p54.html, ***Physics Today***. Vol. 55, p. 54.

- **i.** Agere. http://www.agere.com/careers/
- **ii.** Applied Materials http://www.appliedmaterials.com/careers/
- **iii.** Google. http://www.google.com/jobs/
- **iv.** Hewlett Packard. http://h10055.www1.hp.com/jobsathp/
- **v.** IBM. http://www.ibm.com/employment
- **vi.** IBM Research. http://www.research.ibm.com
- **vii.** Intel. http://www.intel.com/jobs/index.htm
- **viii.** Lucent. http://www.lucent.com/work/work.html
- **ix.** Microsoft.http://members.microsoft.com/careers/international.htm
- **x.** PPG http://corporate.ppg.com/PPG/SciTech/default.htm
- **xi.** Texas Instruments. http://www.ti.com/recruit/
- **xii.** Yahoo. http://careers.yahoo.com/

f. **Official Job Site of the US Government**. http://www.usajobs.opm.gov

**g. US Government Labs**

- **i.** Argonne National Lab http://www.anl.gov/Careers/index.html
- **ii.** Brookhaven National Lab. http://www.bnl.gov/HR/jobs/
- **iii.** Fermi National Lab. http://www.fnal.gov/
- **iv.** Idaho National Lab. http://www.inel.gov/
- **v.** Jet Propulsion Lab. http://careerlaunch.jpl.nasa.gov/
- **vi.** Lawrence Berkeley Lab. http://jobs.lbl.gov/
- **vii.** Lawrence Livermore Lab. http://jobs.llnl.gov/prod_index.html
- **viii.** Los Alamos National Lab. http://www.lanl.gov/
- **ix.** NASA. http://www.nasajobs.nasa.gov/
- **x.** NIST. http://www.nist.gov/public_affairs/employment.htm
- **xi.** Oak Ridge National Lab. http://www.ornl.gov/
- **xii.** Pacific Northwest National Lab. http://www.pnl.gov/
- **xiii.** Sandia National Lab. http://www.sandia.gov/

h. Be sure to know where you could be employed

## Chapter 8
## DO YOUR OWN THINKING

This chapter is the one where we let you in on the secret that despite all the advice and professional resources and available consulting expertise, no one is able to tell you how to make the most of your education and technical expertise. The best that we can do is to describe the trends that have existed in the past and to try to project existing job needs in the future. We can also provide anecdotes of specific scientists who have had different types of careers, but remember that each of these people developed under different circumstances and has a different educational and personal background from all the others. It is therefore difficult to make generalizations about what you need to do to succeed. After all, moreover, your definition of success may be different from someone else's definition. It is therefore your job to figure out where your particular skills and interests will best fit. One stark way to state this point is to say that for the rest of your life you will have to either do your own thinking, or let other people do the thinking for you.

## 8. Do Your Own Thinking

a. "All the problems of the world could be settled easily if men were only willing to think. The trouble is that men very often resort to all sorts of devices in order not to think, because thinking is such hard work." *Thomas J. Watson*
*b.* "I always have a quotation ready. It saves original thinking." *Dorothy Sayers*
c. Have you participated in writing a grant proposal?
d. Have you ordered equipment or software?
e. Have you designed an experiment?
f. Read ***Practical Experiment Designs for Scientists and Engineers***, by William J. Diamond, Third Edition. Wiley Press. 2001.
g. Have you learned statistics?
h. Read ***Applied Multivariate Statistical Analysis***, by Johnson and Wichern. Fifth Edition. Prentice-Hall. 2002.
i. If your project involves multi-variate data, read ***Graphical Analysis of Multiresponse Data***, by Basford and Tukey, Chapman & Hall/CRC. 1999.
j. How do you make decisions?
k. What is the next step in your project?

# Chapter 9
# LEARN SOFT SKILLS

Another important step in the professional development of a scientist is the ability to learn a variety of non-technical skills. In some cases in the existing literature, these skills are referred to as *Soft Skills*. Some of this information has been codified in books, and these books are listed below.

## 9. Learn Soft Skills

a. Read "Some Boosts for Your Career," by Joseph A. Robinson. http://www.ieeepcs.org/pdfs/may_jun00.pdf. IEEE PCS Newsletter, Vol. 44, No. 3, May/June 2000, p. 18.

b. Read "Tools and Obstacles," by Cheryl and Peter Reimold, http://www.ieeepcs.org/pdfs/sep_oct01.pdf. IEEE PCS Newsletter, Vol. 45, No. 5, pp. 18-19.

c. Read ***Stuff You Don't Learn in Engineering School: Skills for Success in the Real World***, by Carl Selinger (November 2004). http://www.carlselinger.com. http://www.wiley.com/WileyCDA/WileyTitle/productCd-0471655767.html

d. Read ***A PhD is Not Enough: A Guide to Survival in Science***, by Peter J. Feibelman (Paperback, January 1994). http://www.amazon.com/gp/product/0201626632/102-5516575-9738503?v=glance&n=283155

# Chapter 10
# JOIN PROFESSIONAL ORGANIZATIONS

Professional organizations provide an environment in which scientists can interact with other scientists in similar technical fields or with a similar technical background who have been working in the field much longer than they. Specifically, recent PhD graduates have typically had the opportunity to interact with other new PhD graduates and with their advisor. The opportunity to join professional organizations provides exposure to many other experienced scientists who may have worked in a field for decades. The purpose of this chapter is to provide a list of organizations and to encourage the scientists to join the relevant organizations and to consider volunteering their expertise and time.

**10. Join Professional Organizations**

a. APS
  - **i.** American Physical Society
  - **ii.** http://www.aps.org
  - **iii.** ***Physics Today*** (free monthly magazine for APS members)
  - **iv.** ***APS News*** (free monthly circular)

b. AAAS
  - **i.** American Association for the Advancement of Science
  - **ii.** “the world’s largest scientific society”
  - **iii.** http://www.aaas.org

c. AAPT
  - **i.** American Association of Physics Teachers
  - **ii.** http://www.aapt.org

d. AAS
  - **i.** American Astronomical Society
  - **ii.** http://www.aas.org

e. MRS
  - **i.** Materials Research Society
  - **ii.** http://www.mrs.org
  - **iii.** ***MRS Bulletin*** (free monthly magazine for MRS members)

f. OSA
  - **i.** Optical Society of America
  - **ii.** http://www.osa.org
  - **iii.** ***Optics and Photonics News*** (free monthly for OSA members)

g. Engineering Societies: IEEE & IEEE societies
  - **i.** Institute of Electrical and Electronics Engineers

ii. http://www.ieee.org
iii. ***IEEE Spectrum*** (free monthly magazine for IEEE members)
iv. IEEE Solid-State Circuits Society (**SSCS**)
    1. http://www.sscs.org
    2. ***IEEE SSCS Newsletter*** (free for SSCS members)
v. IEEE Lasers and Electro-optics Society (**LEOS**)
    1. http://www.i-leos.org
    2. ***IEEE LEOS Newsletter*** (free for LEOS members)
vi. IEEE Women in Engineering (**WIE**)

## Chapter 11
## READ CASE STUDIES

People who have many types of experiences can teach us how to use the knowledge we acquire through our studies – how to think, how to treat other people, and how to make decisions. There are many examples, and in this section we include some examples (mainly from the New York Times, but there are also many good examples in the Wall Street Journal and other sources).

## 11. READ CASE STUDIES

**a.** New York Times, Business Section, "THE BOSS"

i. **Andrew Prozes, Chief Executive, LexisNexis Group**: "I was asked to be a manager for a large mutual fund project when I worked for a computer services company in Canada. I was around 25 at the time. My job was to convert the mutual funds' punch card system to an automated system. At that age I thought it was all about the process, all about having meetings, checking off items, but it turned out to be a horrible disaster. When you go from a paper-based system, it's an extremely complex conversion. You have to make sure everything in the paper system is properly transferred. But the conversion process wasn't accurate, and the electronic system did not duplicate what the paper-based system had done. I didn't realize part of what I had to do was ensure that adequate checks and balances were built into the system. I also didn't get close enough to the action to totally understand what was going on. I suffered internally and I suffered at the company because I was moved from being a potential star to being a question mark. The lesson I took away was that it's absolutely critical that when working on any project you develop relationships with the people so you can hear what it is that they're really thinking. That means getting to know them. Get them sufficiently comfortable so you know what's going on. I got a lot of help in completing that project. It took much longer than expected: instead of two months, it took two years. At that point, I just basically put my head down and worked my way through it. My boss had to step in and save the day. He was a wonderful individual with a big heart. I kept my job. I reclaimed myself."

ii. **Stephanie DiMarco, Chief Executive, Advent Software:** "After starting without two nickels to rub together, I don't take anything for granted. I had a dirt-cheap education, I worked hard and I picked the right entry point in an industry. The company I started now has a billion-dollar market capitalization. Too often, people forget how lucky we are to live in a free and open society where these things can happen."

iii. **Paul Zeven, Chief Executive, Philips Electronics North America:** "I have had a lot of bosses in my career who really had an influence not only on my leadership style but also on my way of thinking and shaping my values. One was in the middle of my career at Philips. He was a people-oriented leader. I was reporting to him directly in a group of six people and I was his No. 2 guy. He showed me that if you manage people well that was half the battle. There was one project that was very important to us, but we all said we could not do it. Technically and physically, it was impossible. He wanted us to finish the project in a year's time, but normally the throughput was two to three years. We thought he was absolutely out his mind. We told him so. He said 'Tell me what resources you need. I will support you through it…..Look, guys, you are the best guys I have to get around the table and you can get it done.' We started to think: If he believes in it and believes in us, why not believe in ourselves. He left us alone to do the project and that gave us great pride. He did not bully us or threaten us. He motivated us, facilitated us and opened doors. It was really hard work, working weekends. We pulled out all the stops. All the rules were discussable. We made it happen. We got the product on the table and it was approved in one year's time. I never have forgotten that experience. He showed us that he trusted we could do it, and we did."

iv. **Charlie MacCormack, President and Chief Executive, Save the Children, Westport, CT:** [quoting Eduardo Mondlane, leader of the Mozambique Liberation Front, who was assassinated in 1969] "I was taking the seminar with 10 or 11 other students. He said to all of us, from what I remember: 'You are in a tiny fortunate minority with the education you're getting, the opportunities you have. You have the luck of the draw. You're fortunate to have been born where you were born. If you were born in Mozambique there would be no education, no safety, no hope for the future. All of you are fortunate young people and you really ought to think about getting involved in these issues, issues of decolonization, development and international affairs. These are the most important issues of your life.' "

v. **Dr. Paula Johnson, Executive director, Connors Center for Women's Health and Gender Biology, Brigham and Women's Hospital:** "As a third-year medical student, I had to learn the language of medicine and understand the values and currency. For instance, in presenting cases before teams of other physicians, you have to communicate a certain way. There's an expectation about how you summarize the facts and tell the story. It's a learned skill. You can achieve great things only if you understand how the environment you are in operates."

vi. **Peter C. Georgiopoulos, Chief Executive, General Maritime Corporation:** "In America, you get the sense you can do anything you want."

vii. **Brian Gallagher, Chief Executive and President, United Way of America:** "One of the best things my father ever did was to get me a summer construction job when I was in college. I had it for three years. If you ever need motivation to stay in school, go to United States Steel, climb 150 feet into a dormant blast furnace and tie yourself to six other guys. Then disassemble that furnace. Or work in the propane fields at Standard Oil when lightning strikes, arcs onto one of the propane tanks and blows it up. After these assignments, I appreciated how hard some people work……I've been in this organization [The United Way] my entire career….I decided two things. First, I would always remember the reason I joined this organization, to help others….Second, I was never going to allow anyone else associated with this business to hurt us. Crises teach you to focus on mission, to communicate, and to be open and transparent."

viii. **Enrique T. Salem, Group President, Worldwide Sales and Marketing, Symantec:** "In April 2002, about two months after I got there, PC Magazine had a review of products that were able to fight spam. In effectiveness, we came in dead last……I recruited a new head of sales, Mike Connor, and a new head of engineering, Brad Kingsbury. Four months after the first rating, I found out that the magazine was going to do another review in the November issue. PC Magazine said they needed our software by Sept. 1. For the next weeks, it was lots of coffee and lots of pizza. By the time the issue came out, we had gone from last to first."

ix. **Susan Sobbott, President, Open division, American Express:** "Watching my dad, I learned the importance of not disappointing a customer. Several times I'd hear the phone ring in the middle of the night, then the front door opening and closing. Once he left to rescue a driver whose trailer was wedged under an overpass. He found him and let some air out of the tires. Another time, he drove to Vermont to help fix a truck that had broken down. Dad was also eternally optimistic. There was always some drama going on.

An account would drop on him, or someone didn't pay a bill, or an employee would walk out. But my father's attitude was that he would get through it no matter what…….When I left my first management position, the sales support team gave me a bunch of red pens as a parting gift….I thought my way was the right way, but you learn more if you listen to others."

b. **New York Times Obituaries**
   i. P. B. MacCready, 81, Inventor, NYTimes Obituaries Friday August 31, 2007: "You can do all kinds of things if you just plunge ahead…It doesn't mean you're any good at them, but you can be good enough."

c. **New York Times Business Section**
   i. **Edison, Sunday March 11, 2007, page 9:** "Edison's partial loss of hearing prevented him from listening to music in the same way as those with unimpaired hearing. A little item that appeared in a Schenectady newpaper in 1913 related the story that Edison supposedly told a friend about how he usually listened to recordings by placing one ear directly against the phonograph's cabinet. But if he detected a sound too faint to hear in this fashion, Edison said, 'I bite my teeth in the wood good and hard and then I get it good and strong.' The story would be confirmed decades later in his daughter Madeleine's recollections of growing up. One day she came into the sitting room in which someone was playing the piano and a guest, Maria Montessori, was in tears, watching Edison listen the only way that he could, teeth biting the piano."

## Chapter 12
## LEARN ABOUT LEADERSHIP

**12. LEARN ABOUT LEADERSHIP**

a. Bill George, **True North**. From the New York Times book review by William J. Holstein: “One view that emerges is that the soul of leadership cannot be taught. Instead, leaders are shaped by personal crises or other life experiences – often early in life but also in the middle stages of life – that give them a burning sense of mission. If Mr. George is correct, much of the money that is spent on leadership development has been wasted.”

b. Ben Stein, **How to Have a Business Conversation: Ten Conversation Tips:**
   - i. 1. Begin by knowing that the people you’re talking to mostly want to talk about themselves.
   - ii. 2. Establish common ground.
   - iii. 3. Say kind, generous things to your conversation partner.
   - iv. 4. Keep your comments brief.
   - v. 5. Get back on common ground as soon as you can.
   - vi. 6. Don’t brag unless you do it in a funny way.
   - vii. 7. Unless you’re specifically asked about it, don’t talk about religion at all.
   - viii. 8. The same goes for politics.
   - ix. 9. If you talk about current issues, do so in a genial, friendly way.
   - x. 10. Make whatever points you need to make in a hurry, and then leave.

c. Dead Poets’ Society: What are the Four Pillars?
   - i. Tradition
   - ii. Honor
   - iii. Discipline
   - iv. Excellence

d. **Create Your Own Brand of Excellence**
   - i. Read: http://www.jobjournal.com/article_printer.asp?artid=2109
   - ii. Dale Carnegie once stated, "There are four ways, and only four ways, in which we have contact with the world. We are evaluated and classified by these four contacts: **what we do, how we look, what we say, and how we say it**." By creating your own unique brand, you are prepared to make a lasting impression in all four areas of contact.

## Chapter 13
## AIP 2007 Salary Survey

**Source: AIP Member Society Survey: 2006 Salaries, by Raymond Y. Chu**

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**Table 1. Salaries for university full professors on 9-10 month salary base by years since PhD, March 2006.**

| Years since PhD | Average salary | Median salary | Typical salary range (a) | Standard deviation | Median age | Number of respondents |
|---|---|---|---|---|---|---|
| | (in thousands of dollars) | | | | | |
| within 10 | * | * | * | * | * | * |
| 10 to 14 | 87.5 | 83.0 | 75.0 to 94.0 | 24.1 | 42 | 34 |
| 15 to 19 | 90.0 | 85.5 | 73.0 to 102.0 | 21.7 | 47 | 102 |
| 20 to 24 | 105.8 | 101.1 | 83.5 to 120.0 | 29.1 | 51 | 105 |
| 25 to 29 | 101.6 | 97.5 | 80.0 to 113.0 | 28.2 | 56 | 98 |
| 30 to 34 | 108.1 | 102.0 | 90.0 to 125.0 | 29.6 | 60 | 108 |
| 35+ | 116.8 | 120.0 | 90.0 to 137.1 | 32.7 | 66 | 121 |

** Too few respondents for reliable calculations.*

*(a) Twenty-five percent of the salaries fall below the typical salary range and twenty-five percent are above the typical salary range.*

Source: AIP Member Society Survey: 2006 Salaries, by Raymond Y. Chu

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**Table 2. Salaries for university full professors on 11-12 month salary base by years since PhD, March 2006.**

| Years since PhD | Average salary | Median salary | Typical salary range (a) | Standard deviation | Median age | Number of respondents |
|---|---|---|---|---|---|---|
| | (in thousands of dollars) | | | | | |
| within 15 | * | * | * | * | * | * |
| 15 to 19 | 119.1 | 113.0 | 97.7 to 120.0 | 36.9 | 49 | 30 |
| 20 to 24 | 128.0 | 119.0 | 100.0 to 151.0 | 43.3 | 52 | 34 |
| 25 to 29 | 120.4 | 110.0 | 100.0 to 132.0 | 29.5 | 56 | 29 |
| 30 to 34 | 141.3 | 130.0 | 103.2 to 170.0 | 40.0 | 62 | 33 |
| 35+ | 181.2 | 165.0 | 130.0 to 210.0 | 62.0 | 67 | 38 |

** Too few respondents for reliable calculations.*

*(a) Twenty-five percent of the salaries fall below the typical salary range and twenty-five percent are above the typical salary range.*

Source: AIP Member Society Survey: 2006 Salaries, by Raymond Y. Chu

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**Table 3. Salaries for university associate professors by years since PhD, March 2006.**

| Years since PhD | Average salary | Median salary | Typical salary range (a) | Standard deviation | Median age | Number of respondents |
|---|---|---|---|---|---|---|
| | (in thousands of dollars) | | | | | |
| Base 9-10 month | | | | | | |
| within 5 | * | * | * | * | * | * |
| 5 to 9 | 74.9 | 75.0 | 60.0 to 88.9 | 17.4 | 40 | 45 |
| 10 to 14 | 75.9 | 75.0 | 65.4 to 87.0 | 15.0 | 42 | 102 |
| 15 to 19 | 74.1 | 74.0 | 63.0 to 86.0 | 14.7 | 47 | 69 |
| 20 to 24 | 71.0 | 70.0 | 64.0 to 81.5 | 16.3 | 53 | 30 |
| 25+ | 71.7 | 70.0 | 63.0 to 80.0 | 13.0 | 61 | 32 |
| Base 11-12 month | | | | | | |
| within 10 | * | * | * | * | * | * |
| 10 to 14 | 88.0 | 80.0 | 73.0 to 98.0 | 21.4 | 44 | 19 |
| 15+ | * | * | * | * | * | * |

** Too few respondents for reliable calculations.*

*(a) Twenty-five percent of the salaries fall below the typical salary range and twenty-five percent are above the typical salary range.*

Source: AIP Member Society Survey: 2006 Salaries, by Raymond Y. Chu

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**Table 4. Salaries for university assistant professors by years since PhD, March 2006.**

| Years since PhD | Average salary | Median salary | Typical salary range (a) | Standard deviation | Median age | Number of respondents |
|---|---|---|---|---|---|---|
| | (in thousands of dollars) | | | | | |
| Base 9-10 months | | | | | | |
| within 5 | 60.3 | 61.0 | 52.5 to 67.0 | 10.2 | 34 | 86 |
| 5 to 9 | 63.3 | 63.0 | 56.0 to 70.0 | 10.9 | 37 | 120 |
| 10 to 14 | 62.6 | 62.0 | 52.0 to 68.0 | 13.9 | 42 | 32 |
| 15+ | * | * | * | * | * | * |
| Base 11-12 months | | | | | | |
| within 5 | * | * | * | * | * | * |
| 5 to 9 | 80.9 | 73.0 | 62.5 to 84.0 | 26.4 | 35 | 18 |
| 10 + | * | * | * | * | * | * |

** Too few respondents for reliable calculations.*

*(a) Twenty-five percent of the salaries fall below the typical salary range and twenty-five percent are above the typical salary range.*

Source: AIP Member Society Survey: 2006 Salaries, by Raymond Y. Chu

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**Table 5. Salaries for university research faculty by years since PhD, March 2006. (a)**

| Years since PhD | Average salary | Median salary | Typical salary range (b) | Standard deviation | Median age | Number of respondents |
|---|---|---|---|---|---|---|
| | (in thousands of dollars) | | | | | |
| within 5 | 54.8 | 55.0 | 45.0 to 63.8 | 17.4 | 33 | 35 |
| 5 to 9 | 60.8 | 62.0 | 50.0 to 69.9 | 15.7 | 39 | 68 |
| 10 to 14 | 68.0 | 66.0 | 58.0 to 77.0 | 18.2 | 44 | 52 |
| 15 to 19 | 73.8 | 72.0 | 58.0 to 90.0 | 21.5 | 49 | 32 |
| 20 to 24 | 92.7 | 91.0 | 80.0 to 108.0 | 24.5 | 57 | 42 |
| 25+ | * | * | * | * | * | * |

** Too few respondents for reliable calculations.*

*(a) Postdoctorates not included.*

*(b) Twenty-five percent of the salaries fall below the typical salary range and twenty-five percent are above the typical salary range.*

**PLEASE NOTE: University research faculty includes respondents in a wide variety of positions, fields of work, and funding situations that are reflected in the relatively wide salary ranges within this table. Some reported salaries within or below the typical salary range of postdoctorates, while others reported salaries as high or higher than those earned by associate professors.**

Source: AIP Member Society Survey: 2006 Salaries, by Raymond Y. Chu

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**Table 6. Salaries in industry by years since PhD, March 2006.** (a)

| Years since PhD | Average salary | Median salary | Typical salary range (b) | Standard deviation | Median age | Number of respondents |
|---|---|---|---|---|---|---|
| | (in thousands of dollars) | | | | | |
| within 5 | 86.2 | 85.0 | 75.0 to 98.0 | 18.7 | 35 | 78 |
| 5 to 9 | 106.9 | 103.0 | 86.4 to 124.0 | 33.2 | 38 | 152 |
| 10 to 14 | 114.3 | 111.8 | 97.0 to 125.0 | 29.2 | 43 | 108 |
| 15 to 19 | 124.1 | 116.0 | 100.0 to 140.0 | 34.6 | 49 | 101 |
| 20 to 24 | 124.5 | 111.3 | 98.4 to 140.0 | 43.7 | 52 | 118 |
| 25 to 29 | 131.4 | 125.0 | 108.0 to 146.0 | 41.0 | 56 | 103 |
| 30 to 34 | 137.0 | 130.0 | 110.0 to 170.0 | 45.9 | 61 | 64 |
| 35+ | 153.5 | 150.0 | 110.0 to 180.0 | 55.4 | 66 | 41 |

*(a) Postdoctorates not included. There were not enough postdoctorates to calculate reliable median salary.*

*(b) Twenty-five percent of the salaries fall below the typical salary range and twenty-five percent are above the typical salary range.*

Source: AIP Member Society Survey: 2006 Salaries, by Raymond Y. Chu

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**Table 7. Salaries for those primarily doing long range research in industry by years since PhD, March 2006.** (a)

| Years since PhD | Average salary | Median salary | Typical salary range (b) | Standard deviation | Median age | Number of respondents |
|---|---|---|---|---|---|---|
| | (in thousands of dollars) | | | | | |
| within 5 | 85.7 | 84.5 | 75.0 to 93.5 | 14.4 | 35 | 20 |
| 5 to 9 | 104.1 | 100.0 | 87.3 to 130.0 | 24.5 | 36 | 31 |
| 10 to 14 | 112.7 | 111.8 | 100.0 to 120.0 | 21.5 | 43 | 26 |
| 15 to 19 | 112.2 | 104.0 | 93.0 to 140.0 | 22.8 | 49 | 21 |
| 20 to 24 | 125.3 | 106.5 | 97.0 to 143.2 | 38.1 | 52 | 32 |
| 25+ | 137.3 | 145.0 | 110.8 to 160.0 | 31.2 | 60 | 44 |

*(a) Postdoctorates not included. There were not enough postdoctorates to calculate reliable median salary. Long range research includes basic research and long range applied research.*

*(b) Twenty-five percent of the salaries fall below the typical salary range and twenty-five percent are above the typical salary range.*

Source: AIP Member Society Survey: 2006 Salaries, by Raymond Y. Chu

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**Table 8. Salaries for those primarily doing short range research in industry by years since PhD, March 2006.** (a)

| Years since PhD | Average salary | Median Salary | Typical salary range (b) | Standard deviation | Median age | Number of respondents |
|---|---|---|---|---|---|---|
| | (in thousands of dollars) | | | | | |
| within 5 | 85.3 | 86.0 | 72.0 to 98.0 | 18.0 | 34 | 45 |
| 5 to 9 | 99.6 | 100.0 | 85.0 to 116.0 | 21.6 | 38 | 88 |
| 10 to 14 | 113.5 | 111.0 | 93.0 to 126.0 | 29.0 | 43 | 61 |
| 15 to 19 | 125.0 | 120.0 | 103.5 to 142.0 | 32.8 | 49 | 54 |
| 20 to 24 | 112.5 | 107.0 | 96.0 to 120.0 | 25.4 | 53 | 52 |
| 25 to 29 | 123.6 | 118.3 | 105.0 to 135.0 | 31.6 | 55 | 51 |
| 30+ | 127.3 | 120.0 | 105.0 to 150.0 | 35.7 | 64 | 48 |

*(a) Postdoctorates not included. There were not enough postdoctorates to calculate reliable median salary. Short range research includes short range applied research, development, design, and engineering.*

*(b) Twenty to five percent of the salaries fall below the typical salary range and twenty to five percent are above the typical salary range.*

Source: AIP Member Society Survey: 2006 Salaries, by Raymond Y. Chu

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**Table 9. Salaries in the Federally Funded Research and Development Centers (FFR&DC) by years since PhD, March 2006.** (a)

| Years since PhD | Average salary | Median salary | Typical salary range (b) | Standard deviation | Median age | Number of respondents |
|---|---|---|---|---|---|---|
| | (in thousands of dollars) | | | | | |
| within 5 | 94.6 | 97.2 | 79.6 to 107.4 | 13.6 | 34 | 31 |
| 5 to 9 | 100.9 | 100.0 | 92.0 to 108.0 | 19.7 | 38 | 68 |
| 10 to 14 | 112.5 | 115.0 | 100.0 to 121.2 | 19.1 | 44 | 61 |
| 15 to 19 | 119.1 | 115.0 | 110.0 to 127.8 | 16.3 | 47 | 60 |
| 20 to 24 | 135.5 | 135.0 | 117.0 to 152.0 | 26.7 | 51 | 53 |
| 25 to 29 | 136.3 | 130.1 | 120.0 to 155.0 | 26.8 | 56 | 51 |
| 30 to 34 | 143.2 | 133.0 | 120.0 to 170.0 | 27.5 | 59 | 40 |
| 35+ | 130.8 | 135.0 | 105.0 to 152.5 | 32.5 | 64 | 37 |

*(a) Postdoctorates not included. There were not enough postdoctorates to calculate reliable median salary. Examples of Federally Funded Research and Development Centers are Argonne National Laboratory and Sandia National Laboratory.*

*(b) Twenty-five percent of the salaries fall below the typical salary range and twenty-five percent are above the typical salary range.*

Source: AIP Member Society Survey: 2006 Salaries, by Raymond Y. Chu

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http://www.aip.org/statistics

**Table 10. Salaries in the federal government by years since PhD, March 2006.** (a)

| Years since PhD | Average salary | Median salary | Typical salary range (b) | Standard deviation | Median age | Number of respondents |
|---|---|---|---|---|---|---|
| | (in thousands of dollars) | | | | | |
| within 5 | 78.8 | 76.0 | 66.0 to 85.0 | 18.6 | 35 | 41 |
| 5 to 9 | 92.7 | 90.0 | 80.0 to 100.0 | 18.1 | 40 | 56 |
| 10 to 14 | 105.0 | 100.5 | 95.0 to 120.0 | 17.0 | 44 | 55 |
| 15 to 19 | 114.5 | 112.1 | 100.0 to 130.0 | 23.5 | 48 | 70 |
| 20 to 24 | 118.3 | 120.0 | 106.0 to 138.0 | 19.3 | 52 | 74 |
| 25 to 29 | 123.0 | 130.0 | 105.0 to 139.7 | 20.8 | 57 | 59 |
| 30 to 34 | 129.4 | 134.8 | 121.0 to 142.1 | 23.0 | 62 | 47 |
| 35+ | 135.2 | 140.0 | 130.0 to 145.0 | 19.3 | 65 | 54 |

*(a) Postdoctorates not included. There were not enough postdoctorates to calculate reliable median salary.*

*(b) Twenty-five percent of the salaries fall below the typical salary range and twenty-five percent are above the typical salary range.*

Source: AIP Member Society Survey: 2006 Salaries, by Raymond Y. Chu

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http://www.aip.org/statistics

**Table 11. Salaries for postdoctorates in universities, research institutes and federal labs, March 2006.**

| | Average salary | Median salary | Typical salary range (a) (in thousands of dollars) | Standard deviation | Median age | Number of respondents |
|---|---|---|---|---|---|---|
| University 11-12 mos | | | | | | |
| within 2 yrs since PhD | 40.1 | 40.0 | 36.0 to 43.0 | 5.1 | 32 | 95 |
| 2 to 3 yrs since PhD | 41.6 | 42.0 | 38.0 to 45.0 | 5.4 | 32 | 72 |
| 4 to 5 yrs since PhD | 41.2 | 40.1 | 35.0 to 45.4 | 6.8 | 33 | 38 |
| UARI 11-12 mos | | | | | | |
| within 2 yrs since PhD | * | * | * | * | * | * |
| FFR&DC | | | | | | |
| within 2 yrs since PhD | 57.5 | 53.0 | 49.4 to 66.2 | 9.8 | 31 | 18 |
| Federal government | | | | | | |
| within 2 yrs since PhD | * | * | * | * | * | * |

*(a) Twenty-five percent of the salaries fall below the typical salary range and twenty-five percent are above the typical salary range.*

*UARI = University affiliated research institutes*

*FFR&DC = Federally Funded Research and Development Centers Examples of FFR&DCs are Argonne National Laboratory and Sandia National Laboratory.*

Source: AIP Member Society Survey: 2006 Salaries, by Raymond Y. Chu .

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**Table 12. Salaries for PhDs within five years since degree, March 2006.** *(a)*

| | Average salary | Median salary | Typical salary range *(b)* | Standard deviation | Median age | Number of respondents |
|---|---|---|---|---|---|---|
| | (in thousands of dollars) | | | | | |
| University assistant professors | | | | | | |
| 9-10 mos | 60.3 | 61.0 | 52.5 to 67.0 | 10.2 | 34 | 86 |
| 11-12 mos | * | * | * | * | * | * |
| University research faculty | 54.8 | 55.0 | 45.0 to 63.8 | 17.4 | 33 | 35 |
| Industry | 86.2 | 85.0 | 75.0 to 98.0 | 18.7 | 35 | 78 |
| FFR&C | 94.6 | 97.2 | 79.6 to 107.4 | 13.6 | 34 | 31 |
| Federal government | 78.8 | 76.0 | 66.0 to 85.0 | 18.6 | 35 | 41 |

*(a) Postdoctorates not included.*

*(b) Twenty-five percent of the salaries fall below the typical salary range and twenty-five percent are above the typical salary range.*

*FFR&DC = Federally Funded Research and Development Center. Examples of FFR&DCs are Argonne National Laboratory and Sandia National Laboratory.*

**PLEASE NOTE: University research faculty includes respondents in a wide variety of positions, fields of work, and funding situations that are reflected in the relatively wide salary ranges within this table. Some reported salaries within or below the typical salary range of postdoctorates, while others reported salaries as high or higher than those earned by associate professors.**

Source: AIP Member Society Survey: 2006 Salaries, by Raymond Y. Chu

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## Chapter 14
## ps

**13. ps**

**a.** Read “An Open Letter to the Next Generation,” by James D. Patterson, ***Physics Today***, July 2004, p. 56. http://www.physicstoday.org/vol-57/iss-7/p56.html.