# Running a University-Based Laboratory
## (Guiding Students, Managing Projects, etc.)

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# Eighteen fundamental skills of a scientist

1. How does science work?
2. What is research?
3. Identifying good research problems
4. Writing papers
5. Presentation in front of an audience
6. Obtaining funding
7. Reviewing/refereeing the work of others
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9. **Guiding students, running a lab, managing projects**
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16. **Coping with stress**
17. **Ethics in science**
18. Appreciation for quality rather than quan

# Overview

- Introductory remarks
- How I have approached it
- Some pitfalls
- Concluding remarks

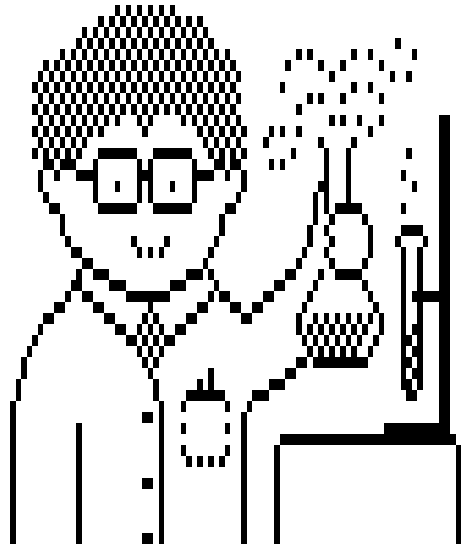
# Introductory remarks

# The catch

- **1997 Outstanding Mentor Award and an invited talk on how I approach mentoring**
- **1992 or thereabouts scouting fishing weekend with my son: *"Now that you have won the competition, tell us how you did it"* ☺**

# Why is mentoring important in science?

- Doing science ("sciencing") is best learned by observing others, most of all people around you.
- Graduate training resembles apprenticeship.
- Best places to do graduate study is where you can find really good academics (holds both for researchers and teachers) and follow their model.



- There are many things that your trainee will get for free from you (just like you did from your parents and your mentors).
- Being a mentor is just like teaching this course or like being "Survival Skills" workshops …

… only that you have to do it all alone.

# How to do it?

**The baseline is that you have a lot of freedom in how to do it (subject to some legal constraints). It is you who determines the rules.**

- **Forget about tenure, etc.**
- **Take control over your academic life.**
- **Figure out what is most important to you and what your strengths are (i.e., what you can give of yourself).**
- **Base your approach on your strengths.**
- **Do not be afraid to experiment.**

# How have I approached it?

# The very beginnings ...

**“If you are a soldier, be a good soldier, otherwise you will get killed and you will get your colleagues killed along with you.”**

**Józef Szymczak (my grandfather)**

**“I want to be a good academic and a good teacher. Otherwise I will be wasting my time and the best times of the lives of my doctoral students.”**

**Marek (Józef) Drużdżel (that’s me ☺)**

# Other foundations ...

**“Love your neighbor as much as you love yourself.”**

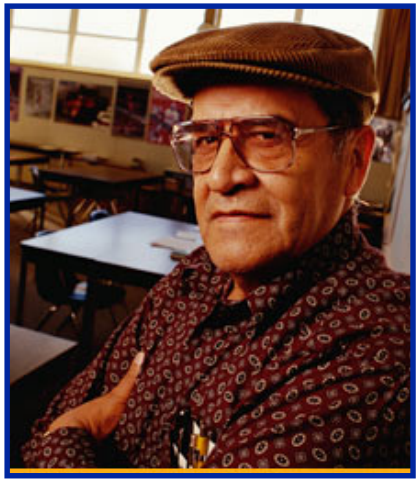
**Regina Drużdżel (my mother)**

# More specific foundations ...

"If we expect kids to be winners and expect them to do well, they will rise to the occasion.

If we expect kids to be losers, they will be losers."

Jaime Escalante



"You can make top soldiers out of anybody."

General Stanisław Sosabowski

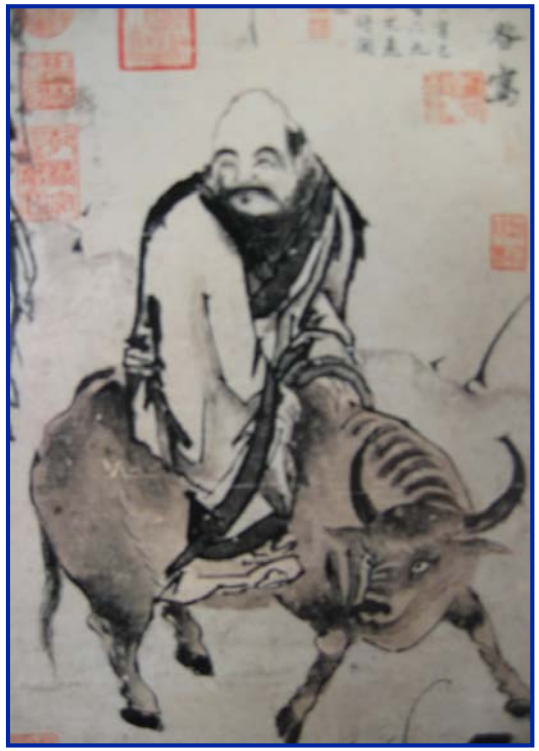
# Leadership

**The wicked leader is he who the people despise.**

**The good leader is he who the people revere.**

**The great leader is he who the people say,**

**'We did it ourselves.'**



**Lao Tzu**

**Another version:**

***"A leader is best when people barely know he exists, when his work is done, his aim fulfilled, they will say: we did it ourselves."***

# The algorithm

```
procedure GoodMentor()
think;
repeat forever
        do;
        observe;
        learn;
        reflect;
        correct;
end repeat
```

# What is important in mentoring?

- That your students move on and reach higher than your reached yourself.

  **Make this clear to them.**

- That they get the best out of themselves to achieve this.

  **Help them to see that they have it all.**

- That they accomplish it all by themselves.

  **Do not lead them by the hand.**

- That they learn a lot.

  **It will be the easiest for them to learn from you.**

- That they get your support at this stage of their career.

  **Support them, both materially and mentally.**

# What is most important in mentoring?

**Inspire, show the possibilities,**

**show how to do it**

**… but let them do it by themselves.**

# Love what you do (or do what you love?)

"Choose a job you love, and you will never have to work a day in your life."

Confucius

"No one, I think, does successful research of any significance unless there is fun in doing it, and unless he or she believes in the significance, personal and social, of what is being done."

Herbert A. Simon

# Be a scientific role model

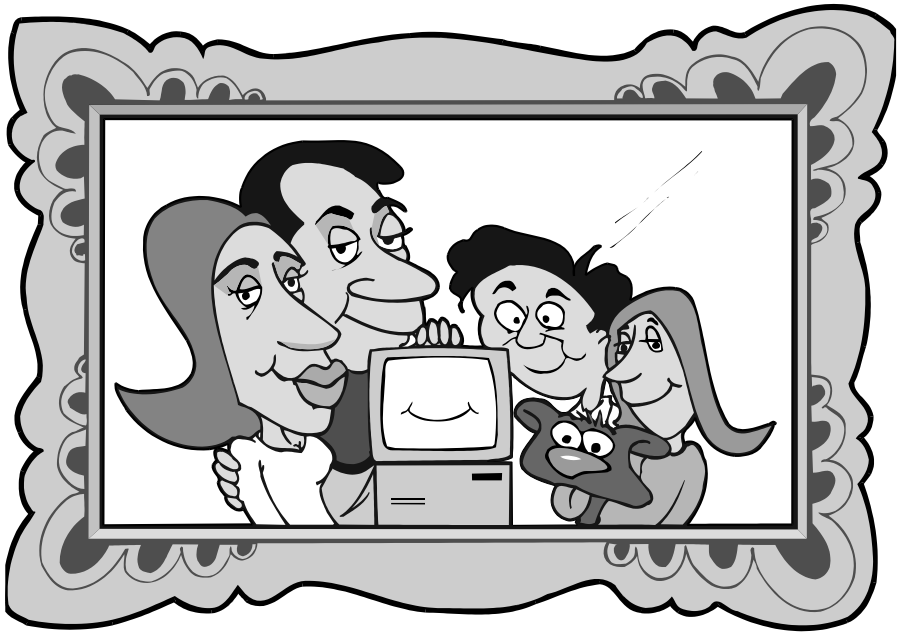
- Students learn a lot by observation, they are absorbing ("stealing") your knowledge.
- Make it worth "stealing" from you and do not mind it: expose yourself.
- They will learn more from you if they respect you as a person and as a scientist.
- If you want to produce first class scholars, you need to be a first class scholar yourself to start with.
- Try to get the best out of yourself first, then your people.
- Your students are often your employees, but special ones – in an academic environment they are your younger colleagues. Respect them.

# Be a personal role model

- There is more in mentoring than professional contact.
- Guide them not only in research, but also set a good example in ethics, collegiality, civil service, etc. Personal interaction is very important.
- Just act naturally, be yourself, but be such that they will find it worth following you.
- Do not let the students see you do unethical things. This means plainly “Do not do unethical things.”
- Talk with them over tea or coffee, take them for a walk now and then (interactions are then more relaxed).
- Invite them to your home for July 4th BBQ, Thanksgiving, or Christmas (especially international students).

# Teach by example

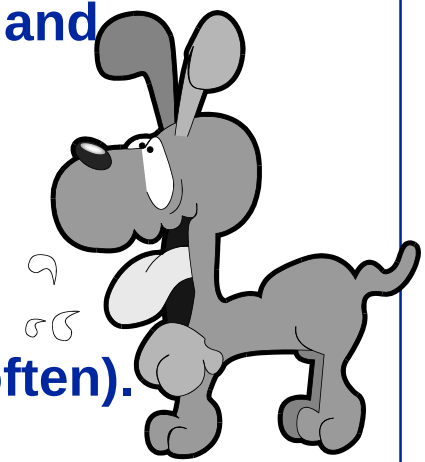
- Share good and bad things that happened to you in your professional life; this will give them an idea how to handle problems (especially difficult ones); it will also make them realize that problems are a part of life, even in science ☺.
- Show them that you also work hard.
- Have them see you in a library on a Saturday morning, in the lab at 2am.
- Think aloud once in a while in individual research meetings – they will see that there is no magic in your approach and they can do it too!



# Healthy environment

There is an inequality built into the system: you are the professor, he/she is a student. You need to create a healthy environment for your trainees. Some ideas (Katz, 1976):

- Attend to the needs of the students (office space, equipment, adequate stipend).
- Show interest in their personal development, recognize their progress.
- Facilitate exchange of ideas between the students and other members of the research group (a weekly seminar?).
- Encourage cooperation rather than competition.
- Foster imagination and creative pursuits.
- Help students satisfy their curiosity (talk to them often).
- Encourage students to take a variety of courses to promote a broad knowledge base.



# Identify the skills that students have to learn

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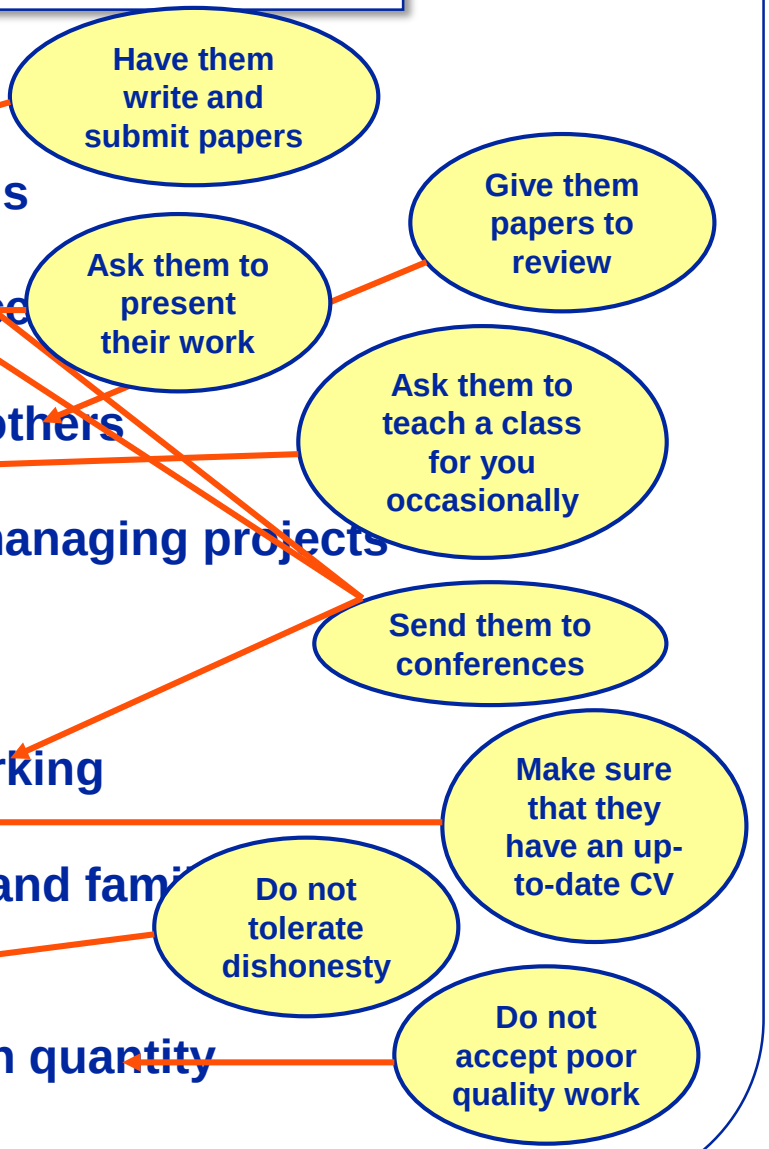


# A mission statement is helpful

**Write your lab's mission statement and have everybody know it and understand it.**

**The mission of the Decision Systems Laboratory is to build a world-wide reputation for excellence in research and academic training. It is our goal to have the name Decision Systems Laboratory associated with high quality work. We want others, especially those respected by the scientific community, to know us and say, "They do really good work there." We want our graduates to be respected and sought after by other centers of excellence.**

**Write up your lab's research focus and approach to the point of listing the journals and conferences that you want to submit to.**

**Make everybody feel proud and responsible for the lab's success.**

# Your laboratory (space)

- Gives the students a permanent place to work.
- Stimulates a shared sense of responsibility for the group.
- Brings everybody physically together.

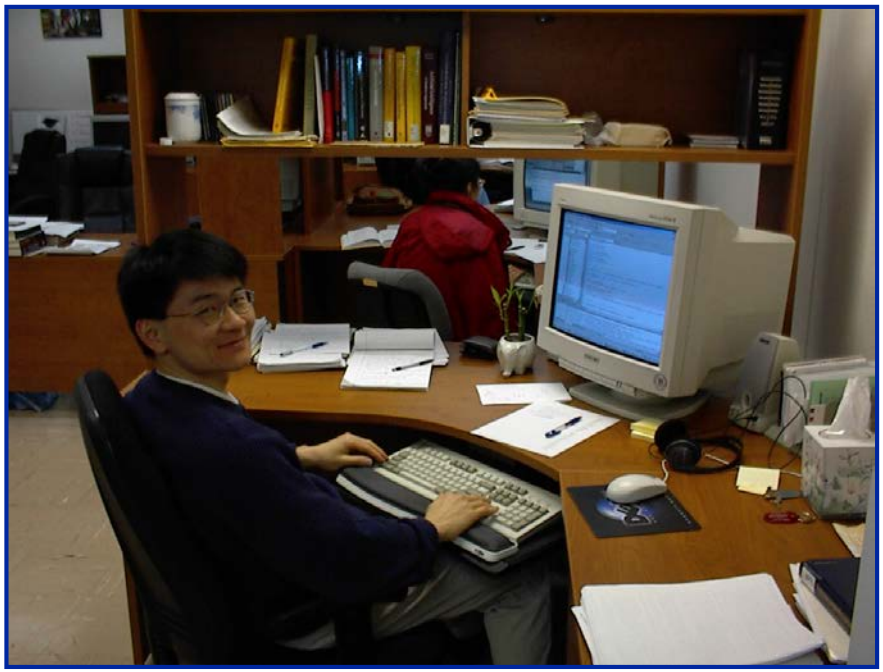
**Get research space for your laboratory.**

**Make it pleasant to work in.**

**This is very important.**

# Teaching courses and mentoring

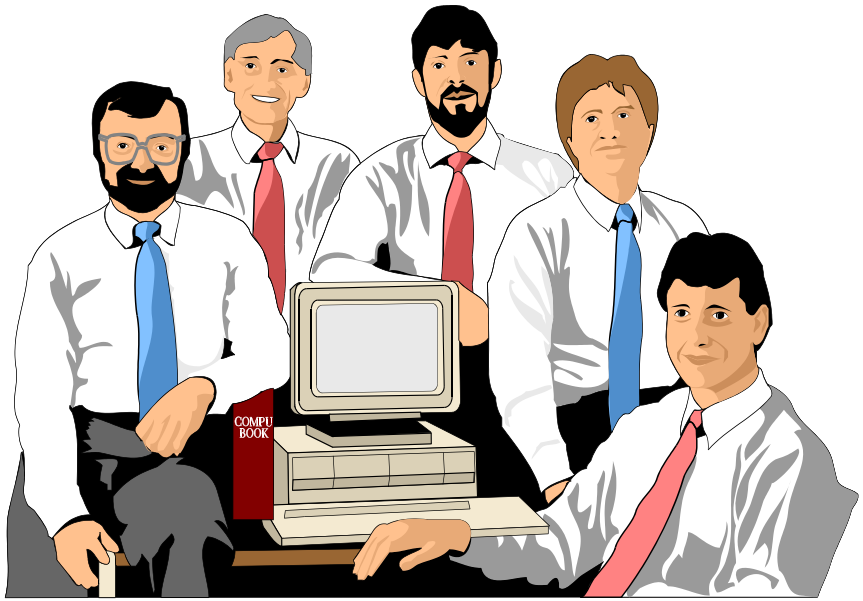
- Teaching is incredibly valuable for doing research.
- You will get to know students, they will learn you and your work.
- You will give initial training to your students.



- Try to teach at least one advanced course in your area of research (broadly speaking).
- If the department does not have such a course, create it (the idea here is that you should teach what you are best in).
- If the department does not want to create such a course, consider offering it outside your regular duties.

# Team building

- A team works much better than a group of disconnected individuals.
- Replace competition by collaboration.
- Share responsibilities but also privileges.
- Teach people to give and accept constructive criticism.
- Give a feeling of permanence (it's not a project, it's a lab!).
- You can make better decisions together (and your people will learn to make better decision at the same time!).



# Team building: Show that you value everyone

**What is the common theme in the following pictures?**

**Always make both arrival and departure of your employee/student an event!**

# Team building: Show that you value everyone


"I've been fired, but they were really nice about it."

# Keep your relationships

- Only then will your former student or your former programmer correct his/her programs ☺.
- Help them with their careers and keep in touch with them

# Keep your relationships

## Sometimes keeping relationships has highly tangible effects ...

CENTER FOR PHILOSOPHY OF SCIENCE

UNIVERSITY OF PITTSBURGH

### HONORING HARVEY AND LESLIE WAGNER

*The following remarks were given by **Adolf Grünbaum** at the dinner honoring the Cathedral of Learning Society.*

Well before Harvey and Leslie Wagner received the University of Pittsburgh Chancellor Mark A. Nordenberg's invitation to attend this festive ceremonial event, they had planned a celebration-trip of their own, with their whole family. Thus I wish to convey their regrets to you, Mark, and to the members of the Cathedral of Learning Society.

Mr. Wagner rose from humble beginnings in Washington, D.C., and was an undergraduate at Lehigh University, where he majored in industrial engineering in the mid-1950s. My first academic appointment in philosophy in 1950 was at that University, where I taught courses in my specialty, philosophy of science, and also some of

teaching had been so very crucial to his success as chairman and chief executive officer of Teknekron Corporation. This company specializes in technology transfer, and the development of new high-tech companies.

On the first visit that my wife, Thelma, and I then paid to the Wagners at their home on Lake Tahoe, Harvey pulled out a desk drawer containing all of the lecture notes he had taken in my courses. Since then we have been their vacation guests every summer and have become warm family friends.

When Harvey put the question to me as to just how he and Leslie might tangibly express his gratitude, I instantly had an answer. Ever since 1960, when I came to Pitt and

Adolf Grünbaum with Leslie and Harvey Wagner.

# Keep your relationships

## Sometimes keeping relationships has highly tangible effects ...

**2014 Distinguished Alumni Award**

**Debra D. King (MSIS ’85)**

**Highly successful business woman, engaged in mentoring.**

**Offered assistantship during her M.Sc. Studies**

**She spoke about it warmly as “investing in her” and gave it back (with generous interest!) by establishing the *Barbara E. King Scholarship Award* (her mother) with a gift of $300,000 to benefit iSchool students.**

# Keep your relationships: Letters of recommendation

**An honorable duty: Write strong (but truthful) letters of recommendation.**

# As a leader you can't afford to be indecisive

**Some people just cannot make up their mind and cannot make a decision.**

# Annual retreat can work really well

**Goals:**

- Revising/updating our mission statement.
- Solving big problems.
- Solving smaller problems.
- Team building.
- Strategic planning.
- Learning each other in an informal setting (cooking, walking, horse riding, Frisbee playing, etc.)

# So do other social outings ...

# Decision Systems Laboratory

## Key organizational elements:

- Annual retreat (traditionally in September).
- Frequent social events.
- Weekly “research” meetings.
- Weekly lunchtime “business” meetings (Fridays noon-1pm, lunch provided).
- We shared responsibility for the lab (day-to-day tasks).
- We made decisions together (the faculty had the right to veto and can be called upon by the chair of a meeting to make a decision in case of an impasse).
- Nothing was written in stone (our mission statement was the most important document guiding us).

# Decision Systems Laboratory

**Sharing of the work has to be real ☺**

# Decision Systems Laboratory

- Standard documents: Mission statement, appointments, working hours.
- A real product (GeNIe software)
- Bringing yourself to the level of the doctoral students, sharing the lab with them is an interesting idea: good and bad things about it; this is somewhat risky.

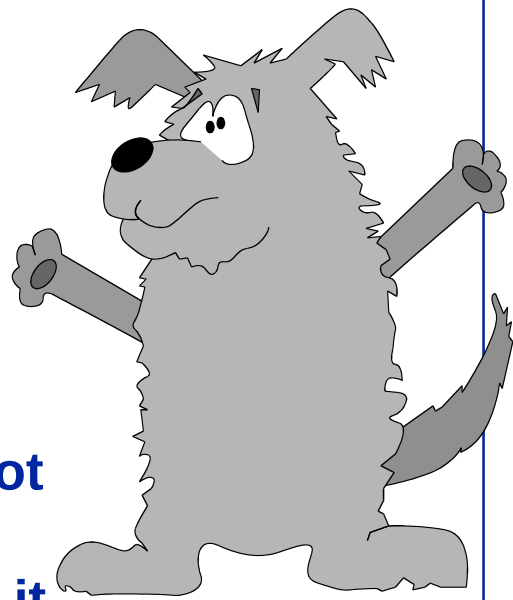
# Workplace: Scientific output is the main goal

- Scientists can work in any place and at any time: Do not tell your people when and where to work (lab, home, coffee shop, etc.).
- Output is the goal, effort is the means: The story of a guy who “did nothing.”
- Show appreciation to your people by offering small awards (e.g., an iPod, an iPad, or a new desk chair for their first paper).

# Some pitfalls

# Pitfall 1: Initial “desperation” for students

- Very likely you will be desperate to have “your” students when you start as a junior faculty.
- You will want to give them everything: your time, enthusiasm, full protection, ideas, authorship on papers.
- Beware!



## How to do it better?

- Focus on obtaining money (grants), hire students, choose them carefully.
- Do not be afraid to reject a student who approaches you if you judge that he/she is not well prepared or motivated.
- Be good for your trainees, but do not overdo it. Remember, they have to do it all by themselves!

# Pitfall 2: Laboratory space

- Space is scarce in every academic department on Earth.
- It is very likely that you will have to fight for it.


- Consider negotiating space for your lab and your students before you accept an offer from a university.
- Watch out because space is often a sensitive issue!

# Pitfall 3: University administration

- Some universities (especially public and state-supported ☺) are extremely bureaucratic.
- Sometimes you think that the main task of the administration is to make faculty's life difficult.
- The higher you look in the hierarchy, the worse it seems to be!

- Achieve your business goals through persistence and personal charm (seems to works even in bureaucratic environments).
- Make those not charmed realize that it is the faculty who make the university work. Remind politely that their main task, at least theoretically, is to make your life easier.

# Pitfall 4: Administrative duties

- A faculty member is expected to perform service duties (committee work inside, various functions outside the university).
- Additional administrative duties come with your lab and grants.
- They can take all your time.
- Do not take too many things at the same time (also in terms of your research).
- Learn to decline kind offers to join a “Committee on …”.
- Choose the duties that you want to do because they are important.
- Distribute routine tasks among lab members.

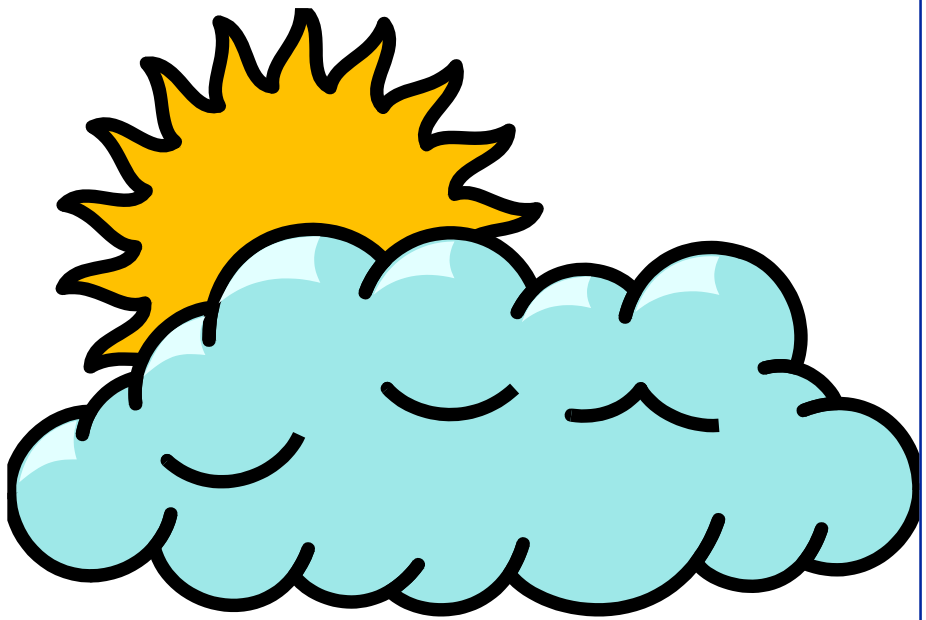
# Pitfall 5: Recognize student's problems early

- Sometimes it happens that a student is in trouble (e.g., lack of motivation, personal problems, other plans than doing science).
- Freedom of time and place of work can backfire.
- Do not wait too long and leave the student alone.
- Talk, point out decreased performance.
- Ask if there is any way you can help.
- Sometimes a little pressure from you will help.

- If things do not work, it is quite OK to be give up.

# Pitfall 6: “Course-taking,” “reading,” “browsing” mode

- Beginning students have often been indoctrinated almost since kindergarten that courses and grades are important.
- Grades are poor predictors of success in research.
- Introduce an incentive to switch gears and get into research mode from the first day in the lab.
- Required research presentations, “first-year papers,” etc., usually help.
- Advanced successful students usually provide an excellent stimulus for positive competition.



# Pitfall 7: Responsibilities

- A research lab is a group of people working under a permanent time pressure.
- These people have a natural tendency to neglect “less important things.”
- This makes everybody’s life hard.
- Make sure to clearly define lab responsibilities and also to enforce them.
- Make research responsibilities modular and, if possible, relatively independent, so that it is always clear who did a good job and who performed poorly.

# Other useful hints

- Allow freedom in time and place of work (within the necessary constrains).
- Send your students to conferences, introduce them to your colleagues, help them in creating the initial network.
- Being a role model is important, as there are things outside of typical curricula that are important to learn during graduate studies (e.g., the art of criticizing and taking critique).

# Other useful hints

- Nominate your students for various awards if their work is competitive, remind about submissions to student paper competitions.
- Introduce small incentives for milestones (important examination passed, paper accepted to a prestigious journal or conference). Celebrate with the students.
- Recognize and praise good work and achievements – this is an amazingly strong factor in success.
- When they do a poor piece of work, let it know, but gently – smart and ambitious students often know by themselves that they have not done their best.
- If a student who is otherwise intelligent is a little obstinate (or is smart but does not get it), let him/her figure it out by themselves.

# Conclusion

# Where to find more information?

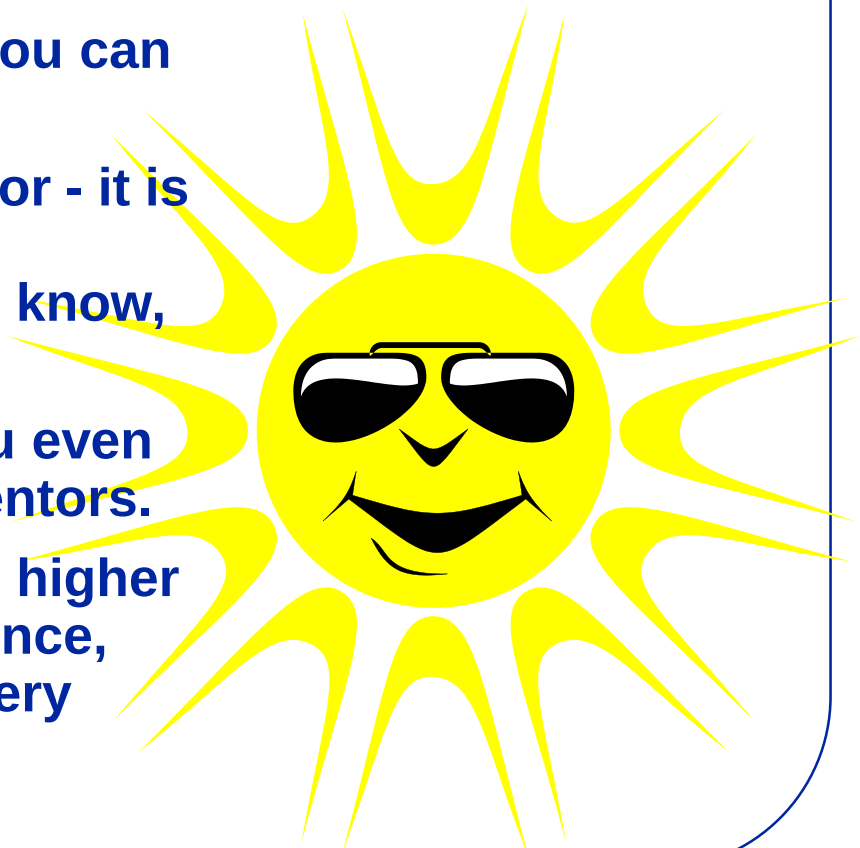
**Quite a number of resources.**

**Some of my favorites:**

- **Susan A. Ambrose & Cliff I. Davidson, *"The New Professor's Handbook: A Guide to Teaching and Research in Engineering and Science."* Anker Publishing Company, Inc., Boston, MA, 1994**
- **Marie desJardins "How to Be a Good Graduate Student|Advisor" http://www.cs.umbc.edu/www/graduate/advice/advice.html**
- **Richard Feynman's *"Surely, You are Joking Mr. Feynman"* and *"What Do You Care What Other People Think?"***

# Concluding remarks

- Being a mentor is fun: Personal satisfaction from producing "intellectual" offspring is just phenomenal.
- It is not easy, but if you enjoy it, you can do it, guaranteed.
- You cannot be a "part-time" mentor - it is an "all or nothing thing." You are mentoring not only with what you know, but also with who you are.
- Think about mentoring before you even start doing it. Learn from your mentors.
- Some light that guides you, some higher level inspiration (e.g., love of science, love of people, religion) may be very helpful.



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**Next week**