Research Seminar
(Formation à la Recherche)

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Building 650, (PCR) or Ada LoveLace

Class Assignments

Take the user’s perspective (in this case, me)

Include your name!
Inside the file: Wendy Mackay, Research Seminar, #3

You will face information overload, sooner or later, so begin to address it now

Your own work

If you continue a career in research—or anything else—you will write many reviews, papers, etc.

Give them useful names!
Include dates, titles, authors

Organize them according to project

Not: projectdescription.pdf

Label your assignments

For this class, please label your assignments as follows:

At the top of the page:
2014 MR2 <Assignment name> <LAST NAME> <First name>

Example (if I were a student):
2014 MR2 #3 Review MACKAY Wendy
How do you choose an internship or “stage”? 

First, decide what you want to do next

- Do you want to teach?
  - University professor track
- Do you want to do research?
  - Academic research
  - Industry research
- Do you want to go into industry?
  - large corporation
  - small company
  - create a startup

Something else?

Where do you want to work?

- In your own country?
  - other country?
- In France? Europe? North America?
  - Asia? Other parts of the world?

Internships

- Introduce you to real-world research lab conditions
  - but each lab is different
- Help you decide what you’d like to do next
- If you do well, in a good lab, provide you with a critical start on a research career
Evaluate the lab you're going to

- Make sure you are in a good lab!
  - Poor training now can hurt your career

- How do you know what's a good lab?
  - Bibliometrics

- How do you know if your advisor is any good?
  - Differences between senior and junior researchers

Internships

Choosing a topic

- Easiest: Pick one of their topics
- Best: Suggest something related, but related to what you want to do

Key outcomes

- Conduct publishable research
  - (ideally, publish it!)

- Figure out if you really like doing research
  - and whether or not you are good at it

- Get a great letter of recommendation

- Start your research network

- Apply for a Ph.D. grant (course)

How do you choose a Ph.D.?
### What is a Ph.D. (Doctor of Philosophy)?

In 3+ years you will:
- become a world expert on your topic, and
- write a doctoral dissertation: 150-300 pages of original research

You must develop a **thesis**: something **that you believe!**
- State it clearly
- Justify it with your research
- Make it the foundation for future research

### Levels of education

<table>
<thead>
<tr>
<th>Education</th>
<th>Duration</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>High school</td>
<td>3-4 years</td>
<td>under-graduate</td>
</tr>
<tr>
<td>University</td>
<td>3-4 years</td>
<td>graduate</td>
</tr>
<tr>
<td>Masters</td>
<td>1-2 years</td>
<td></td>
</tr>
<tr>
<td>Ph.D.</td>
<td>3-4 years</td>
<td>(France)</td>
</tr>
<tr>
<td>Ph.D.</td>
<td>4-8 years</td>
<td>(US, UK, Germany…)</td>
</tr>
<tr>
<td>Post-doc</td>
<td>1-2 years</td>
<td></td>
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</table>

Masters degrees are pretty similar in Europe and North America. Length and scope of Ph.D.s can vary greatly.

### Advanced research careers

<table>
<thead>
<tr>
<th>Government research</th>
<th>Principle research scientist</th>
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</thead>
<tbody>
<tr>
<td>Junior research scientist</td>
<td>Chargé de recherche</td>
</tr>
<tr>
<td>Charge de recherche -&gt; Directeur de recherche</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>University research</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assistant professor</td>
</tr>
<tr>
<td>Maître de conférence -&gt; Professeur</td>
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<table>
<thead>
<tr>
<th>US</th>
</tr>
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</table>
| Start with a temporary position  
~7 years: try for tenure (a permanent position) or else get fired |

<table>
<thead>
<tr>
<th>France</th>
</tr>
</thead>
</table>
| Start with a permanent position  
~7 years: write an habilitation, apply for senior position |

### Other jobs that benefit from a Ph.D.

<table>
<thead>
<tr>
<th>Industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Startups</td>
</tr>
<tr>
<td>Small companies</td>
</tr>
<tr>
<td>Large companies</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Academia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government research</td>
</tr>
<tr>
<td>Inria, CNRS</td>
</tr>
<tr>
<td>University</td>
</tr>
</tbody>
</table>
How do you find a Ph.D. grant?

- You must find a
  - Topic: usually related to your masters, not always
  - Lab: at or associated with a university
  - Advisor: talk to them!

Sources of Ph.D. funding

- Government grants
  - Local: U.P.S. Ecole Doctorale bourse
  - National: Inria CORDI grant
- Thesis advisor’s research grants
  - Government: (Country, EU, NSF)
  - Industry: (CIFRE, Inria-MSR)

Different universities—different processes

- Each country has a unique process
- Individual universities differ as well

- You will have to investigate:
  - application procedures
  - deadlines
  - entry requirements
  - funding opportunities
  - length of the degree
  - content of the degree
  - jobs when you are done

Entry requirements

- Curriculum vitae (C.V.): includes your education and work history
- Transcripts (grades): translate (not only the language, but what they mean)
- Letter of motivation: make it specific to the position
- Letters of Recommendation: choose people who know you, not just ‘famous’ people

For Ph.D. students …

- What is the problem?
  - How you frame the problem influences the solution
- What is your solution?
  - Framing the problem well often points to a solution
- Why is this problem difficult?
  - Why haven’t others solved it already?
- What is your evidence?
  - Empirical finding, Technical advance
  - Mathematical algorithm, Theoretical foundation
  - Real-world impact, Something else?
Questions to answer

What is your research community?
- Who has the problem?
- Who needs the solution?

How does your work compare to existing research?
- Who else is addressing the problem?
- Why are they different?

Who will benefit from your work?
- Users? Researchers? Industry?

What is the potential impact of your work?
- Short-term? Long-term?

State your thesis

One sentence
- What do you believe, based on your work?

One paragraph
- Add the problem definition and context
- Add the justification: empirical, theoretical, technical
- How will others cite your thesis?

Can you describe your thesis?

1. Elevator
   One-two sentences

2. Cocktail party
   3-4 paragraphs

3. Short talk
   10 minutes

4. Long talk
   30 minutes

5. Defense
   60 minutes

In each case, you need to communicate the key point.

Letters of Motivation
Letter of motivation – What is it?

Also: Statement of purpose
Personal essay

Common for Ph.D., scholarship and job applications
An essay that explains what you hope to achieve in the program you are applying to as well as what qualifies you to be the top candidate for the position.

Shows your personality, not just facts
Both what you can contribute and how you will benefit.

Letter of motivation – Why?

Take the perspective of the person who will read it … and letters by perhaps 100 others

Are you what they are looking for and how can they tell?

Do you come across as:

honest? capable of clear thinking? highly motivated?

Don't be too modest … or too arrogant

You should be answering “why”

Letter of motivation – How to start

Look up examples: BUT DO NOT COPY THEM!
Write a unique letter for each application
Figure out the exact format to use
Avoid restating your CV
Draft a set of answers to key questions:

Why this program? Why you?

Write, get feedback, rewrite …

For example

How to Write a Letter of Motivation

When applying for a graduate programme leading to a Master’s degree in Germany, applications are requested to submit a Letter of Motivation sometimes also called statement of purpose (“Motivationsschreiben”). These letters of motivation play an important role in the selection process. Regrettably, however, they often fail to convince any member of a selection committee.

How do you write a successful letter of motivation?

1. Take your time and start early. The letter of motivation is a crucial document in your application. Never try to write it down in one sitting.
2. Do not start your letter of motivation by repeating your CV.
3. The letter of motivation should answer the following questions:
   - What is your professional goal? In which sector would you like to work after obtaining your Master’s degree?
   - How do you want to contribute to the social, political or technical development of your home country once you return in a respective position? (You may refer to knowledge from books and newspapers as well as to your professional or personal experiences. Some facts and figures are highly welcome.)
   - What are you applying for? The chances for success of the programme are increased if you can prove that you fit into the concept of the programme.
   - Why do you think you are the right person for the programme?
     - What knowledge and skills gathered in your previous education will be useful?
     - What experience have you gathered in your previous employment?
     - Are you a member of an organization? (Students association, political party, volunteer service…)? If yes, what part of your membership? (Your social involvement)
     - What do you expect from your own personal development? Do you think you are a good leader? Are you somebody who can make a difference? (Emphasize your strong points, but be realistic.)
   - Why do you want to study in Germany?
     - What do you know about the German university system and the specifics of studying in Germany? (For technical subjects you might want to visit the German Embassy or the German Academic Exchange Service.)
     - Are there any German organizations, institutions or companies where you would like to contribute to the development of your home country?
     - Which sector would you like to work in once you are in a respective position?
     - Is there anything in Germany (e.g., political system, economy) which you think could serve as a model for your own country? To get some reading material from German organizations, visit the DAAD website: www.facts-daad.de
     - What knowledge and skills gathered in your previous education will be useful?

The letter of motivation is a crucial document in your application. Never try to write it down in one sitting. The letter of motivation should be a unique letter for each application, and start early. The letter of motivation is a crucial document in your application. Never try to write it down in one sitting.
Optional exercise: Write a letter of motivation

- Work in groups of two from the same domain
- Find a research lab where you would like to work
- Write a two-paragraph letter of motivation:
  - Why do you want to work in this lab and with whom? (Ph.D.? internship? research project?)
  - Why are you a good candidate? (relevant skills, experience, degrees)
  - What would you like to do? (specify a research question and how it relates to their work)

Letters of recommendation

Ask for a letter of recommendation

- Letters of recommendation
- Administrative documents
- You are asking an extremely busy person to do you a personal favor that probably does not help that person
- Put yourself in their shoes and make it EASY for them

Letters of Recommendation

- Decide how to contact the letter writer: In person? Email? Paper letter?
- ASK first if they are willing
- Explain exactly what they need to do
- Don’t wait until the last minute
- Give them a real deadline and double-check
Letters of Recommendation

Provide all relevant documents
- Don’t expect them to stand by the printer and print your documents

Make it easy:
- Post-it note to show where to sign
- Addressed, stamped envelope to send
- or a website to upload (with appropriate passwords)
- or an email address to send it to

Letters of Recommendation

Either write it yourself and let them edit it
- or
- Give them all the relevant information

Why do you need the letter?
- Applying for a position, Ph.D., grant

How do they know you?
- Details: when you first met, work you’ve done together
- Accomplishments they should mention
- Personal characteristics to emphasize

Letters of Recommendation

‘Damned with faint praise’

Poor letters are short, vague and general
- Jean attended my class and performed well.

Good letters are longer, detailed and personal
- Jean was a top student in my Research Seminar. He always came to class well prepared and contributed insightful comments during class discussions. I was particularly impressed by the review he wrote on Smith’s classic paper, in which he ….

Letters of Recommendation

Confidentiality

Will you be able to read the letter …

or not?
Letters of Recommendation
Help the instructor remember you …
be memorable! (in a good way)
remind them of what you did

Letters of Recommendation
Part I: Write an email request for a letter of recommendation
"Would you be willing to write a positive letter …"
Who are you? How do they know you?
Why are you qualified? What is the letter for?
When is it due? What is the process?

Homework Assignment #4:
Ask for a Letter of recommendation

Class Exercise: Writing Walkthrough

Subject: Recommendation for Wendy MACKAY
Dear <Name>:
I met Wendy Mackay …
### Exercise: Writing Walkthrough

<table>
<thead>
<tr>
<th>Structured Walkthroughs</th>
<th>(Yourdon, 1979)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Goal:</strong></td>
<td>Find bugs in code</td>
</tr>
<tr>
<td><strong>Technique:</strong></td>
<td>Systematic step-by-step analysis of a document by a small group</td>
</tr>
<tr>
<td><strong>Principles:</strong></td>
<td>Line-by-line analysis, Constructive criticism, Limited time</td>
</tr>
</tbody>
</table>

### Writing Walkthrough: Roles

#### Author
- Explains:
  - Document state: early draft, almost done?
  - Publication: audience? deadlines?
  - Criticism level: structure? style? grammar?

#### Moderator
- Manages session:
  - Timing: 5 min. to read, 15 min. to analyze
  - Keep comments constructive, avoid debates

#### Participants (including author):
- Read through document once
- Write comments on paper
- Offer constructive comments out loud

### Writing Walkthrough: Procedure

- Create a group of authors:
  - 4 people, 20 minutes each = 1 hour 20 minutes

- Preparation:
  - Copy selected document parts (max. 1 page)

- Procedure per author:
  - 05 min: Everyone reads and annotates text
  - 15 min: Start with sentence one:
    - proceed line by line; identify problems

### Writing Walkthrough: Rules

#### Constructive criticism:
- Be positive
- Grammatical errors
- Logic errors
- “I did not understand this”

#### Do not debate:
- Wastes time!
  - Participants identify problems and suggest solutions
  - Authors can accept solutions… or not!
Review questions

Rank the paper:
- [ ] Overall rating (1=poor, 5=excellent)
- [ ] Reviewer expertise (1 = no knowledge, 5=expert)

Please answer the following questions:
- Summarize the contribution to the field (1-2 sentences)
- Provide a detailed review (2-5 paragraphs)
- Indicate specific suggestions for improvement

Assignments

No class on Wednesday 29 October

Due on 5 November:
- Send email and printed version!

Assignment #3 Review
   Either turn in today or revise to make it better

Assignment #4 Ask for a letter of recommendation