Supervision Student Internships

a brief guideline

FIRST SOME GENERAL REMARKS:

- We have to assume that students have **very limited** (basically: no) background regarding **our own** research.
- Our students come from very different disciplines: bachelors in
  - medical biology (very little math and physics)
  - physics (very limited (neuro)biology)
  - science (interdisciplinary biophysics; the best prepared group)
  - other (e.g. Twente, UMC, HAN)
- Goal of every internship: **learn how to do and report on scientific research**
  learn how to critically evaluate results
- **Bachelor** internships differ in essential ways from **Master** internships:

BACHELOR	MASTER
8 – 10 weeks (12 ects; **3rd yr, Q4**)	9-12 months (42-60 ects; **5th yr, Q1/2**)
Get **initial** training experience	Get more **advanced** training
A short single project, ready to go; stricter supervision needed	More exploration possible; more independence after a few months
Typical: a few days/week	Full time
Depends on discipline (B/S/Na)	Only B has 6 and 9 month interns

POTENTIAL NEUROSCIENCE BACKGROUNDS OF FNWI STUDENTS:

Bachelor Neuroscience courses for **Science** (obligatory) and **Physics** (not obligatory):

- Neurophysics 1 and 2 (book Trappenberg, and Ch 1-5 of Purves)
- Psychophysics 1 (syllabus on systems theory and saccades)
- Introduction Machine Learning (Bayesian inference and data modeling)

Bachelor Neuroscience courses for **Medical Biology**:

- Neurobiofysica (book Purves and syllabi on sensory systems)
- Neuroscience (neuron and neuronal processes)
- Hersenen en Gedrag (sensorimotor integration)

Master Neuroscience courses for **Medical Biology, Science, and Physics**:
Obligatory:
- Systems Neuroscience and Behavioral Neuroscience
- Neuroscience Methods
- Systematic Reviews in Neuroscience

Electives:
Auditory Perception, Computational Neuroscience, Machine Learning, Psychophysics 2 (for Science, CNS, and Physics students)

(Note: Physics students **MUST** have done Neurophysics 1+2)

Your assignment: **Always ask the students which courses they have done/passed**

AIM OF THIS DOCUMENT:

- Provide a 'uniform' guideline on how to get started with a student:
  - 1. initial training of background
  - 2. initial training of experimental skills
  - 3. initial training of analysis skills
  - 4. training of writing and presentation skills
- How to plan, monitor, test and supervise the students' projects?
- What can we expect from the students?
  (their role and responsibilities)
- What can the students expect from us?
  (our role and responsibilities)

1. Initial training of conceptual background:

All students should acquire in the **FIRST MONTH** (to 6 weeks) the basic concepts from sensorimotor neuroscience needed to do their internship:

- the auditory system (PURVES, Chapter 12)
- the visual system (PURVES, Chapters 10 and 11)
- the vestibular system (PURVES, Chapter 13)
- Eye Movements (PURVES, Chapter 19)

(if students have followed the ***Neurobiophysics*** bachelor course (6 ec, biology) they can skip these; same for students who passed **Neurophyiscs 1/Psychophysics 1**)

All students should read a couple (4-5) of research papers on sound localization and eye movements (this depends of course on their research topic).

For example:

- review paper of Sparks, 2002 (Nature Neuroscience Reviews)
- review paper of Summer and Wurtz, 2008 (Nature Neuroscience Reviews)
- Van Opstal's book Chapter 7 on the Localization Cues

- Hofman & Van Opstal, JASA 1998 (difficult for Biology students!)
- Hofman & Van Opstal, Nature Neuroscience 1998
- Goossens & Van Opstal (1997), Exp Brain Research (modeling, eye-head)

Writing assignment 4.1: Write a two-page summary of one of the papers, and answer the questions related to the other papers.

2. Initial training of experimental skills:

All students should acquire (with our help) in the **FIRST MONTH** the basic procedures of their experimental setup:

- how is it organized? (essentials of the different hardware components)
- how are signals generated? Magnetic field, speakers, LEDs, NIRS, EEG
- how are they recorded?
- how are they stored?

- the important do's and don'ts of human experiments
- how to prepare and leave an experimental setup
- how to maintain and report in the LAB JOURNAL (!!!)
- ALWAYS run the TEST experiment to verify that the setup works properly

How do you write your own stimulus set? (basics of the ASCI stimulus code)
How do you recognize good signals? (data monitoring and common sense…)
How do you recognize problems, and what should you do? (this is tricky, but students should be aware that there can ALWAYS be a problem!)

Assignment 4.2:

a) Draw a schematic of the entire experimental setup (inputs/system/outputs)
b) Run the standard sound-localization experiment (different stimulus types)

3. Initial training of data analysis skills:

All students should acquire (with our help) in the **FIRST MONTH** the basic procedures of the existing MATLAB data analysis procedures (see Marc's Neurowebsite on http://www.neural-code.com/index.php/help/contact/10-marc-van-wanrooij):

- calibration
- saccade detection
- which files are generated and what type of information do they contain?
- make stimulus-response plots for the different stimuli (i.e., learn data selection)
- do an analysis of reaction times as function of stimulus type (for this the student will have to write his/her own routine)

Assignment 4.3:

a) Analyze your first data set
b) Write a brief report (Intro, Method, Result, Discussion) on the experiment

Plan, monitor, supervise and test the students

All students should carry out the basic training assignments (although some parts may be skipped, depending on background knowledge).
Do the reading and experimental training interleaved, if possible.

Students should be made aware that the Assignments are **obligatory**, and will be weighted in their end evaluation!

During the first month substantial guidance (especially at the setup) will be needed.

Towards the end of the first month to 6 weeks students can start to think about and work out **their own research plan** for carrying out their project:

Assignment 4.4 Generate your first ideas, and write it down, so that we can test how much you really understand at this point.

The writing and thinking **(4.1 – 4.4)** provides us a very good monitor on the student's level, attitude, and potential abilities and skills, all of which have to be trained in the Internship.

Problems should become clear at the very first stages of the internship! (and they should be solved, either through more supervision, or clearer deadlines….)

What can we expect from the students:

- you are aware of the evaluation criteria of your internship (evaluation forms for your internship are available on the internet; you are supposed to know that)
- you maintain contact with your study coordinator (not one of us)

- you have a positive and constructive attitude towards your internship and colleagues
- you are willing to work hard. The internship should be of benefit for yourself, as well as for the research of your supervisor.
- you arrive timely in the lab and notify our secretary and your supervisor if for some reason you will be absent or late.

- you will meticulously keep track of your experimental activities in your **Lab Journal** (obtained at Judith's office, and strictly personal)
- you carry out the Assignments in the first month and hand them over for evaluation on time. Note, that this is an important part of your internship

- you are ethical and responsible towards your work and your subjects.

- you start writing your thesis on time, and hand in the first draft versions to your daily supervisor for feedback as soon as you can.

What can students expect from us:

- they are evaluated in an honest and even-handed way and get regular feedback during their internship to allow them a chance for improvements
- we ensure a good and safe infrastructure and experimental environment
- we assign a **second reader** at the start of the internship

- we make sure they get the daily supervision they need. If we are away for some time we make sure there will be a stand-in
- we help them whenever they get stuck in their work
- we have regular discussions and work meetings with them
- we give them clear assignments with reasonable but strict deadlines
- we regularly check their Lab Journals and ask them to report on their progress

- we encourage them to think independently, and actively search for alternative ideas, interpretations, experimental paradigms, etc.
- we encourage them to start writing parts of their thesis on time, and give them constructive (and concrete) feedback
- we strive to teach them to become skilled, critical researchers with good communicative skills