



AIRE Master

booklet 2018-2019

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General Information

The AIRE Master is designed to help you find your way in research and prepare your professional career in science and education. In addition to courses, you will have the opportunity to learn what research is by doing research yourself in labs, public institutions or companies, and to interact with many researchers on current interdisciplinary research topics.

There are many ways to benefit from the program, as you will be exposed to different ways of teaching and learning. Your fellow students will have an entirely different background than you, which gives you the opportunity to learn from each other. Creativity, original projects and ideas are highly valued, and we encourage you to participate in extracurricular activities such as the CRI student clubs and events. By being involved, and sharing your knowledge, you will spend a very fruitful year with us.

Towards the end of the master program, some of you will pursue a PhD program in France or abroad. Others will start their own project, startups, or join a private company in the fields of science and higher education. One of our roles as teachers is to guide you in this process.

The AIRE Master has three tracks: Life Sciences (Approches Intedisciplinaires du Vivant, or AIV), Learning Sciences (Education Technology, or EdTech) and Digital Sciences (which we are building this year and will open in September 2019).



Guidelines

The CRI is a great environment to foster creativity and collaboration, as you will soon find out. As all communities, however, we need a set of core rules to live peacefully together and to make this year fruitful for everybody.

We communicate with you through your email. After the courses have started, we expect you to check your emails at least once a day, Monday to Friday.

The AIRE Master is a Master program co-hosted by the Universities Diderot and Descartes of Paris. Each of you will be either a Diderot student, or a Descartes student. You will register to the university that you will be assigned to, but you'll follow courses together, and you are equal to us. The courses are physically hosted at CRI, but for what concerns your administrative details (registration, student card, internship agreements and so on) you will have to be in contact with the University to which you are assigned. Our office has no authority over the Universities' administrative processes, as we are CRI staff and not University staff. On the contrary, for whatever concerns didactics (attendance, grades, exams, courses, seminars), you will have to refer to us (the AIRE office). You are, in a nutshell, students from Diderot and Descartes Universities who benefit from dedicated mentoring, small class size, and the thriving CRI environment, besides of course access to our program. Note that the distinction will soon cease to exist, as Diderot and Descartes Universities will soon merge, together with others, in the University of Paris.

Being a CRI student

There is a lot of diversity in this master, but for this to work we have to share several common values and adopt a few guidelines.

1 - Respect deadlines and time schedules. The spirit of the master programme is to instill students with a sense of responsibility, and to maximize exchanges amongst them. As such, it is crucial that you attend all courses. Students are also expected to be on time and to respect deadlines. If you cannot come to a course, let the teachers know about it beforehand. Similarly,



if you feel that you are not going to be able to meet a deadline, or if you have a problem with a course, do let us know as soon as possible. It's much easier to find a solution if we are aware of the problem in advance. If you do not let us know beforehand, we will take your absences into account in your evaluation.

2 - At all times, the master is given the priority. On several occasions you might experience conflicting schedules between internship labs, personal projects or clubs etc, and attending a class or a presentation by your co-students. It is up to you to organize your schedule so that you are able to attend your classes, **even during your internship. You are expected to attend all internship defenses for the whole duration.**

3 - Come prepared. Before classes, read the course materials, the articles or the reviews several times. Participate on the education platforms (Google Classrooms), engage in discussions before and during the sessions.

4 - Be proactive in class. It can be hard to ask questions, but since you are here to learn, it is worth trying again and again. As a rule of thumb, if you don't understand something, just ask!

What to do in case of doubt

We do encourage our student to be independent and to shape their own education (notably through the choice of their internships), but we do acknowledge that students need help from time to time. The coordinators and all your teachers encourage an atmosphere of open communication, so do not hesitate to come to any of us for help - just **send us an email** and we will set an appointment very quickly. We also add a set of [Frequently Asked Questions](#) at the end of this booklet for your convenience.

One of the main aims of our Master program is to help you build your career, therefore we try to conciliate flexibility with the rigid structure of a University program. If you want to do something different from what the program offers (for example an unusual type of internship, or follow another course somewhere else), we will try to help. The important thing to keep in mind is that **the pedagogical team (coordinators and directors) has to be consulted in any case, and all modifications to your curriculum must be thoroughly motivated and discussed before**



receiving approval. Please do not assume that, since a former student told you that something was possible (for example, being abroad during an internship defense), then it means this is still valid for you. As a rule of thumb, **if in doubt, ask us!**

AIRE staff

Directors:

Pascal Hersen

Sophie Pène

Franck Zenasni

Pedagogic coordinators:

AIV: Chiara Fracassi

EdTech: Léa Ponchel

Pedagogic coordinators are the hub between you, the professors and the directors. They take care of everything that is related to didactics - courses, seminars, internships.

Administrative assistants:

Nefeli Paparisteidi

The administrative office takes care of the practical details of courses and events - attendance, logistics, records and internship agreements

AIRE Master - AIV track

Each AIV year class brings its novel mix of biologists, computer scientists, physicists, engineers and more. This diversity in academic paths is a great opportunity for you to discover the power and efficiency of collaborative and mutual teaching and learning.



We expect you to invest a lot of your skills and energy in the different courses by preparing the courses in advance and actively participating during the class.

Starting this year, the course material will be handled through **Google Classroom**. This is a powerful tool to exchange teaching materials and discussions on dedicated forums.

AIV - M1

The first year of the AIV (M1) is designed to teach primarily synthetic and systems biology, with an emphasis on programming, statistics, experimental methods, biophysics and more generally on quantitative approaches in life sciences.

The AIV M1 is divided into two semesters. The first semester, consisting mainly of courses, starts on Monday September 3, 2018 and runs till end of January 2019. The second semester begins on the first of February 2019, featuring a 5 or 6-month internship until the summer break in July 2019.

Please note that **M1 students are required to bring a laptop** in order to follow our courses. If you are unable to get one, **contact us as soon as possible**.

Please take note of the following dates and mandatory events:

- **Introduction to AIV: September 3, 2018.** This is your first day with us! We will have a short introduction to the Master and a meeting with the coordinator.
- **Bootcamp: starts on September 3, 2018 and ends September 21, 2018.** This courses are meant as a recap of fundamental notions that you will need during the courses.
- **AIRE Master day: September 7, 2018.** You will meet your fellow students from M2 and from the EdTech track, as well as your teachers, and the main points of the year will be discussed and presented.
- **CRI Discovery days: October 5, 2018.** It's an event in which all departments and activities of CRI are presented. This year, it will coincide with the inauguration of the new Campus.

- **Midterm exam: Wednesday November 14, 2018.** This is a midterm test (not graded!) to assess your level and identifying students at risk.
- **Deadline for internship proposal: November 30, 2018.** You will have to pick an internship before this date!
- **Individual Feedback session I:** in November 2017 - TBA.
- **Exams** - they will take place in December and during the second week of January.
- **Internship:** beginning February 2018, for 5 or 6 months
- **Individual feedback session II** - around 18 May 2018, TBA.
- **Internship defense: 1 - 2 July 2019**
- **Year Debrief - 2 July 2019**

First Semester (September - January)

The first semester starts with a 3 weeks long bootcamp that gives a condensed overview of the biology, chemistry, mathematics and physics that you will encounter during the semester.

Since you all have a different scientific background, we try to give you a feeling of the subjects that will emerge during the semester, and to give an intuition on which subjects the students should start working on their own. Typically, a student with a physics background needs to work on fundamental biological concepts such as central dogma, evolution, DNA, methods in biology, while a biology student usually needs to focus more on the mathematical and physical concepts that are used in quantitative description of living systems.

After this bootcamp, several core courses will take place every week. You will learn the theoretical and practical concepts that are required to perform scientific research at the frontier between biology, mathematics and physics.

- Science and medicine (8 sessions, J-C. Thalabard) - 6 ECTS
- Systems Biology (10 sessions, C. Nizak) - 6 ECTS
- Neuroscience (10 sessions, G. Gangarossa) - *optional course (0 ECTS)*
- Synthetic Biology (10 sessions, J. Wintermute) - 6 ECTS
- Fundamentals in Computational Biology (12 sessions, G. Batt) - 6 ECTS



- Rule Based Modelling and Whole-Cell Modelling (7 sessions, V. Danos, G. Feret, J. Krivine) - 6 ECTS
- Statistics (10 sessions, E. Cinquemani and V. Perduca) - 6 ECTS
- Dynamics of living systems (10 sessions, S. van Teeffelen and P. Pierobon) - 6 ECTS
- Introduction to Physics of the Cell (6 sessions N. Minc , G. Romet-Lemonne, J-L Maître) - 3 ECTS
- Experimental Methods (3 preparation sessions & 2 weeks lab, Kristine Schauer and Tamara Milosevic) - 3 ECTS

You need to validate 30 ECTS of courses of the first semester, which means to have a final grade equal or higher than 10/20. Grades will be based on your attendance, oral participation in classes, quality of your homework and success in the final exam. Although you need to validate fewer courses over the 10 that are proposed, **we do expect and encourage you to follow all courses** and pass all exams. This is because we created a well-balanced set of courses that will all be beneficial to create well-rounded, quantitative scientists. For your final grades, only the best ones will be taken into account, to a total of 30 ECTS for the first semester.

Since a grade does not provide a comprehensive image of your developed skills and understanding, we will in addition provide you with a **written evaluation**, detailing what your strong skills are and in which aspects you should improve for each courses.

Furthermore, we have implemented a **mid-term exam in November**, where you will be tested on the base concepts of the core subjects. This exam does **not** affect your final evaluation in any way; it's more of a way for us to identify who among you has severe difficulties in a particular subject, so that we can rescue you before it's too late!

Second Semester (February - June)

The second semester will focus on practicing research. You will spend at least 5 months in a research lab. You will also have some mandatory events at the CRI, notably one Masterclass once a Month. In this semester as well, you will have to validate 30 ECTS, subdivided as follows:



- Scientific Communication (9 sessions, Matteo Merzagora) - 6 ECTS
- Internship (full time, for at least 5 months - 24 ECTS)

The course will be held at CRI on Friday mornings in February, March and April, so make sure that your internship supervisor is notified of this mandatory event.

The research internship is an integral part of your training. The internship will be full time, and should consist in a defined project that will lead to results within the 5 month period. Ideally the internship runs from the beginning of February to the end of June, but this can be subject to individual changes as long as the internship lasts at least 5 months. Any research project related to synthetic, systems and quantitative biology is possible. It is a great opportunity for you to discover what actual research in a laboratory entails.

The paperwork to start an internship takes time! That's why we ask you to submit your internship project for validation to the AIRE office **by November 30, 2018**. For information regarding the choice of the internship, the validation process and the internship agreement, see the [dedicated chapter](#) below.

iGEM competition

As an alternative to this long internship, you can apply to the iGEM Paris Bettencourt Team. Every year a small group of students from AIV and other Masters programs around Paris gather their strengths and are hosted by the CRI to setup an iGEM project, and participate in this competition of synthetic biology. This usually starts with brainstorm sessions and project building, which does not require a full time involvement before May or June. Meanwhile, we expect that you find an internship of typically 3 to 4 month before joining the iGEM Team. Note that since the iGEM competition finale takes place in November, you will have to organize yourself to stay in the team up to that date. For those of you continuing with us in the second year of the Master, this means that your first lab rotation of M2 will be dedicated to finishing the iGEM team project.

AIV - M2

The second year of the program starts with a one week workshop in Sologne, outside Paris, that is mandatory for all students. The rest of the year is dedicated to your three internships, each with a minimum duration of 3 months, and a mandatory course every Friday afternoon. Once a month, you will also have to attend mandatory Masterclasses, from invited speakers. To complete the year, you will have to validate 30 ECTS, divided as follows:

- **Course: Creating an Interdisciplinary Research Project (CIRP)**, 9-14 September 2018
- **Course: Critical Analysis of Research Articles (CARA)**, Fridays afternoons from September 2018 to December 2018
- **Course: Bibliographic Synthesis (BibSyn)**, Fridays afternoons from January 2019 to April 2019
- **Course: Zoom In - Zoom Out (ZIZO)**, Friday afternoons from April 2019 to June 2019
- **Internship I**: from October 2018 to December 2018
- **Internship II**: from January 2019 to March 2019
- **Internship III**: from April 2019 to June 2019

The paperwork to start an internship takes time! That's why we ask you to plan way in advance, and to submit your internship project to the AIRE team for validation before the following deadlines:

- Deadline submission of project for Internship I: September 7, 2018
- Deadline submission of project for Internship II: November 1, 2018
- Deadline submission of project for Internship III: January 31, 2019

Other important dates of mandatory events to keep in mind are the following:



- **AIRE Master day: September 7, 2018.** You will meet your fellow students from M2 and from the EdTech track, as well as your teachers, and the main points of the year will be discussed and presented.
- **CRI Discovery days: October 5, 2018.** It's an event in which all departments and activities of CRI are presented. This year, it will coincide with the inauguration of the new Campus.
- **First internship defense: 17-18 December, 2018.**
- **Second internship defense and Thematic Workshop: 8-12 April, 2019.**
- **Third internship defense and final debrief: 1-2 July, 2019.**

More details on internship defenses (which are mandatory events for all their duration) are reported in the following chapter.

Internships

The first thing you should keep in mind about finding a lab that fits your research interest is that it takes quite some time. This is due **both to make sure that you will fit nicely in your hosting research team, as well as to administrative processes.** In this document you find practical information, the administrative workflow of starting an internship, a few tips on how to find an internship, and guidelines for the internship defenses.

Finding an internship is an important process for you, since it forces you to think about which subjects interest you in such extent that you are thrilled to spend a few months studying this subject in depth. The process of finding an internship leads you through several labs, enabling you to interact with researchers and get a glimpse of cutting edge research.

Here are a few tips to help you in your lab hunt, which boils down to: meet and interact with researchers and their students, and visit their labs.

How do I look for an internship?

Finding an internship is entirely up to you. You are not limited to labs that hosted our students before, you are instead encouraged to look for a lab that best fits your interests and career path. These internships can take place in a laboratory, an association, a company, a NGO, etc...



However, sitting down in front of the computer and searching from scratch, not knowing anything about the Parisian research ecosystem, can be intimidating. Here are a few tips to break the ice:

- A list of possible internships is provided on the AIV website. Labs regularly post their internships here. You can also explore the internships that were done the previous years (contact the AIV administration for an updated list).
- Talk to fellow students at CRI, and contact students of previous years who have performed an internship in your field of interest.
- Search on the websites of universities and institutes for a team or a unit according to your interests.
- Talk to FdV students and other students at the CRI: they may know of interesting internship opportunities.
- Perform search on the internet typing key words (e.g. HIV, Paris).

Should you face problems in finding an internship, ask around! Our staff and teachers have a good network to help you find the internship of your dreams.

How do I contact a lab?

As soon as you find a lab that could be interesting for you, contact the PI. Your correspondence should be concise, yet personalized:

1. Keep in mind that **good labs get many applications** for internships. Therefore, you should **personalize** your request and put the name of the person you want to contact in the first line. And make sure to address the following points: Who are you and why are you writing? Why are you writing to this lab in particular? What do you expect from this internship?
2. Write a **straightforward, short email**. Group leaders have very short time on their hands, and if you want their attention, you have to convey the important info in one minute or less.



3. Read the previous and recent work of the lab, and explain what particular part of their work you like most. Give all the details about when will the internship take place (i.e. full time, 5 month starting February), describe any particular experiences you have and your motivation.
4. **Attach a CV**, giving information about your background, possible lab techniques you master, programming skills etc.
5. **Ask if you can meet them** and visit their lab, especially if they are located in the Paris region.

What do I have to ask before choosing a lab?

The important point is to take time to search for a lab in which you will be comfortable during the three or five months and have a real interest in the project.

Your own priorities come first before any PI, laboratory or scientific project. So choose your internships based on them. For example, if during the M2 year you want to learn the maximum while having fun, think about 3 totally different labs and be sure that you get along with the PI and with the team. The more labs you visit the better for you! It means you gain experience in interviews, networking, learning a lot about what is happening in Paris science, tuning what you want, need and appreciate!

Ask if on the occasion of the interview you could come and spend a few hours to meet your advisor **but also the team**. Ask questions about their work and habits in the lab. Especially if there are PhD students or other master students in the lab, speak with them, they will be able to present you the lab and the environment with a different point of view than the one of your (maybe future) supervisor. If a member of the CRI has already worked for the lab, we strongly advise you to ask him about his experience. Bad internships do occur, unfortunately.

Do not hesitate to request details on what you will do during those months. It might be a good idea to ask the PI for a written schedule with some concrete experiments and tasks. If you ask for help or opinions at the CRI (never hesitate to do it), this written project will help your advisers.

It is important to ask during your interview about plans of the lab/PI to take a PhD student next year. Do not feel obliged to promise anything during the interview, but do not expect the PI to promise you anything either.

Do not forget to introduce in your discussion the question of the internship compensation. Some labs (fortunately not the majority!) accept to take you as an intern but are not able to pay you; in this case, you cannot accept their offer and will have to find another internship. It is illegal for you to perform an internship for free.

What your Internship supervisor should know beforehand

From the beginning it should be clear to your supervisor that you will not come to the lab on the days that you have courses at CRI (for AIV, **Friday mornings for M1s and Friday afternoons for M2s**). Also, you will have periods where you will have an extra workload for the course, which results in you certainly having less time for lab work in this period. Make sure that your supervisor is aware of this. In addition to the course and course work, **once a month there is the masterclass for which attendance is mandatory**. In addition, you will have to be present on Friday, October 5th for the CRI Discovery Days.

As you will soon notice, there are a lot of extra-curricular activities at the CRI. If there is a course or an activity you would like to follow, ask your supervisor if it is OK for him/her if you participating in a course during the internship. You should remember that you are expected to work full time on your internship, therefore whatever was not agreed on before the start of your internship should be carried out **outside of your internship hours** (i.e. in the evening).

What to do when you find a match: Internships agreements

In France, lab rotations are regulated by law. The laboratory in which you will perform your internship has to sign a binding agreement with the university you are registered to before you can start to work. **It is a rigid and slow system since many different parties have to sign the same document in four copies**. These documents are available on the websites of Paris Diderot and Paris Descartes universities, through your personal account (that will be given to you by the University after your registration).

Once you have found a research team that is willing to host you, you should start the process for an internship agreement:

1. **Validation.** This step is handled by the AIV office at CRI. A webform will be made available to you. Before the stated deadline, you will have to fill out this form completely. Note that it is possible to update this form any time before the deadline. **It is mandatory to fill out this form.** The validation of your internship is based on this form, which means that the contact information of your labs must be accurate. Also required are a title and an abstract detailing in half a page or less what you will do during this internship. The pedagogical team (composed of teachers and coordinated by Chiara) will quickly assess your proposal and, once validated, you will be notified by email. This will typically be done **at least one month before** the start of your internship.
2. **Filling in the internship agreement.** You will then have to fill out the internship agreement ('convention de stage') in three copies, which you can find on the website of your university (Paris Descartes or Paris Diderot). You have to work out the details with your hosting lab.
3. **Getting all signatures in the right order.** This usually takes some time, so do this as soon as you receive the approval for the internship. **Only when the agreement is signed by all parties, you can then start your internship.** The internship agreement must be signed by the following, in this order:
 - a. **You**
 - b. **Your hosting lab.** Bring them the agreement, and they will take care of it. Since it's the lab's legal representative that takes care of it, it can take weeks, sometimes months!
 - c. **Your referent teacher.** This is a member of the validation committee, which is composed by teachers of the Master. For students registered with Diderot, it's either Dr. Olivia du Roure or Dr. Pascal Hersen. For students registered with Descartes, it's either Dr. Ariel Lindner or Dr. Ana-Maria Lennon. **Bring the agreement to the AIV office** and we will give it back, signed, in a week's time.
 - d. **Your university.** Bring the agreement to the Internship Office of either Diderot or Descartes University.

4. Start the internship, work hard and have fun!

For the M2 students, this process occurs several times during the year, meaning that **you will have to find your next internship while being in the current one**. As usual, if you have questions, if you are facing a difficult choice, or require to adapt the framework of internship, contact us as early as possible.

The benefit of this internship agreement ('convention de stage') is that it will allow you to work under safe conditions: you will be covered by the university **insurance** in the unfortunate, and rare case of accidents, for example an injury or accidentally instigating a massive fire. The other benefit is that you will receive a **financial compensation** of typically 500€ per month for your internship, **if it takes place in France**. French law dictates that any internship lasting **longer than 2 months** (regular working days and hours) must be paid by the hosting lab. This compensation is not negotiable, and you should stay clear from labs that are reserved to pay you for your work, or propose unconventional (and illegal) alternatives such as letting you sign several one-month internship agreements. More importantly, the universities will not sign the 'convention de stage' if the lab refuses to pay you. If you have any doubts or problems related to this issue, please let us know as soon as possible.

An internship outside of Paris, or even abroad

It is possible to perform an internship outside of Paris, in France or abroad. If you are planning to go abroad, please discuss with us what you have in mind as soon as possible. We prefer students to be in or around Paris, so that they can interact and meet every week during the seminars and scientific communications sessions. However, if you can convince us that it is beneficial for you to go abroad for your internship, we help you as much as we can. **For the M2 students, the first internship must be done in or near Paris**, since we want you to be with us for the first semester and enjoy the different group work and social events. When you are abroad, we will ask you to participate to classes (if possible) through Google Classroom, perform an alternative exercise, and follow seminars or courses at your host university in order to compensate for the classes that you will miss.



Unfortunately, **we won't be able to support you financially in case you go abroad**, so you will need to find a fellowship or another way to pay for your travel expenses.

Concerning funding, Paris Descartes and Diderot Universities propose a “Mobility Fellowship” on social and education criteria. With this single application, you can get money from either Erasmus, Région Île-de-France or university. If you are lucky, you will get a maximum amount of 450€ per month... which helps a little bit to live abroad. For accommodation and extra-funding, you should negotiate with your hosting lab.

But *how* do I choose an internship?

It's important to stop and think how you want to *use* your internships. The research experience that you will get from it is very precious, and the more you plan, the better you will be able to use it. Let's consider the following scenarios:

I want to do a PhD afterwards!

Do not fear reading this part if you do not know yet whether you want to pursue a PhD or not (and if so, where that would be). If you know by February or March that a PhD is your future career, you are still on track. But it is true that PhD positions are occupied fast, and you might have a strongly reduced choice of labs proposing a PhD if you start searching in April.

The important thing to keep in mind is that you have to be sure that this is The Lab for you, which depends on your priorities!

If you want to pursue a PhD in France, your first M2 internship could be the most important of your internships, as labs are searching quite early for candidates. Both parties, the lab and you, can consider this as a test period. The optimal situation is to perform your first internship in the lab where you would like to continue for your PhD. In this way, you will have a more secured position, and you can start working on your PhD project early on.

Interviews for PhD internships are extremely competitive. The better you know the team and the project, the better for you. It is possible to prepare a presentation on a PhD project in two weeks, but it will surely be more difficult and stressful than having few months preparation time. Some French doctoral schools ask to submit the PhD projects in the beginning of January. This is the responsibility of the principal investigator (PI), but not all PI's do it systematically every

year. So, if you want to do your PhD in the lab and the PI has the possibility to take a PhD student next year, make sure that your project is submitted on time.

As you will see during the M2 year, time flies. If you know early on in which lab you want to do your PhD, you will be able to apply for more fellowships (ANR, universities...).

If the PI of the first internship is looking for a PhD student, and you and the lab are a great match: perfect! If somehow you feel that you do not match perfectly, you have a second shot with your second internship.

I want to work in an industry or startup!

That's great! We encourage you to apply for internship in companies or startups that might interest you - or even better, hire you after your Master. There is, unlike PhD, no time constraint to get a job in the industry. Use your internships to explore different realities and to build the skills set that might make of you the best candidate for a job later!

I already know where I want to do my PhD!

Lucky you! If you already have a contact for doing a PhD (e.g. your lab from your Master 1 offered to write a thesis project with you, or your first internship was already a good match), all the better. Use then your internships to build a skill set that will maximize your chances of success to get the PhD, or to learn new techniques, models and tools that you might import in the lab for your project. In alternative, use your internships to have fun! Already know that you'll be spending some 4+ years on immunology? Why not take 3 months to study astrobiology?

I have no idea what to do next!

Well, you have three internships to try out things and to find out!

What if I don't have much experience/knowledge in the subject of my internship?

Then this is a great opportunity to learn! It is not an obligation to have experience and knowledge on the subject of your internship, which means that you can apply for internships that you are interested in even if you do not have a solid background in that area. Make sure that you state from the beginning your level of knowledge and show your motivation. Some labs will

gladly take you in, especially if they work on an interdisciplinary project and are accustomed to a mix of different backgrounds.

Internship defenses: oral presentation, abstract, and poster

The internship defenses are scheduled as follows:

AIV M2 Defense I: 17-18 December, 2018

AIV M2 Defense II: April 8-12, 2019 (Thematic workshop event combined with FdV PhD)

AIV M1 and M2 Defense III: 1-2 July, 2019

M1 Defense

Your internship is defended by an oral presentation.

One week before the defense, you have to upload a short abstract on your project with an illustration/graph representative of your project in the designated folder.

The presentation should be 20 minutes long, and there will be 5 minutes for questions. A rule of thumb is 1 minute per slide. Be aware that the audience does not necessarily have the same in-depth knowledge on your project as you have, so it is advisable to keep this mind when preparing your presentation.

Needless to say, you should be on time for the defenses, your own presentation, and make sure that your presentation runs smoothly, that you have the necessary adapters to project your presentation.

M2 Defenses

In general, for all your defenses you have to upload one week in advance in the designated folder, a short abstract on your project with an illustration that represents your project. The day before your presentation you should upload your presentation slides or your poster on a dedicated site so that we can have access to them when necessary.

Be aware that the audience does not necessarily have the same in-depth knowledge on your project as you have, so it is advisable to keep this mind when preparing your presentation/poster. **Usually your lab team will help you to prepare your presentation.**



Needless to say, you should be on time for the defenses, your own presentation, and make sure that your presentation runs smoothly, that you have the necessary adapters to project your presentation.

We expect you to attend your fellows' presentations. This is very important as you will learn a lot about different topics, new experimental or theoretical tools etc.. but you will also develop your critical abilities to evaluate scientific work.

- ❖ Your first internship defense in December is an oral presentation of 15 minutes and 5 minutes for questions.
- ❖ The second internship defense is the Thematic Workshop week organised by AIV M2 students, EdTech M2 students and the second year FdV PhD students. Typically, the M2 students have each a time slot for an oral presentation of their internship.
- ❖ The final defense is together with the M1 students. For this defense, you are required to make and present a poster, usually in A1-size.

AIRE Master - EdTech track

The EdTech track of the AIRE master program is an international cursus dedicated to the study of all aspects of innovation and learning in the digital era. It gathers students from very different fields to collectively think and design the new frontiers of education in a learning society. This diversity in academic paths is a great opportunity for you to discover the power and efficiency of collaborative and mutual teaching and learning.

Our program is designed to help you achieve your own projects through intense collaborative working sessions, mentoring, master classes, internships, international workshops and challenges. You will have a lot of opportunities to participate in relevant events and conferences at CRI and outside. We expect you to be involved in these events (participation, blog post writing, social network sharing...) and to suggest and organize your own events in your free time: you'll see, there will be plenty opportunities for these!

⇒ Useful tools

- **Slack** : This is the main communication channel for the students. You can create your own channels for courses, internships, events, monitoring, internships and jobs opportunities. It also facilitates common files sharing. Moreover, on slack you can easily get in touch with the EdTech alumni.
[Edtechcri.slack.com](https://edtechcri.slack.com)
- **Medium** : This is a collaborative publication for EdTech students. This is not a blog, this is better. This is a social network for long content. You will be asked to write several articles and post them on this platform during the year. It will help you to gain more visibility and to give value to your productions.
<https://medium.com/open-edtech>
- **Other social networks** : We expect you to participate in the life of the Master online with #OpenEdTech. We need you to promote the vision and activities of the EdTech master and we expect you to use the master to brand you own projects. Join our network on Twitter (@OpenEdTech), Linkedin (Group : "EdTech CRI Paris"), Instagram (OpenEdTech), Facebook (Open EdTech / CRI Paris) and make it live !
- **Google Agenda and Google Drive** : the planning of courses and activities is updated on Google Agenda. Make sure to synchronize it! A google drive shared space also comes with your @students.cri-paris.org account. It will be useful to share notes and documents.

⇒ Core concepts of the Master's pedagogy

Mentoring: The role of the mentor is to help you with your projects, deliverables and internships researches. The mentors can be your teachers, the support teams at CRI (typically, the managers of the CRI labs), the alumni and the coordination team. This year, the mentoring is organized per groups of three for an hour - this way, each student learn a lot from the peer-to-peer situation and sharpens his or her own critical skills when to assess a project. Of course, the mentor gives insights on how to lead the next steps of each student's project, but this is also a better way to share and transfer knowledge to everyone in order to build collective tools for a powerful feedback. Mentoring appears every 2 weeks in the agenda as free slots of



one hour when three of you can book their seats. For each mentoring session, the mentor(s) of reference (teacher, coordinator, researcher, peer from the CRI) will be indicated as attendee(s) so that you chose your slot according to the mentor and his/her background. An Excel sheet will also be available in the students shared folder to put their names ahead of each session. Mentoring will officially start after the first week of courses.

Peer-to-peer: students are coming from many different backgrounds. This diversity is one of the most enriching feature for the group. At the beginning of the year, you will for sure need the skills and ideas from each others to catch up some of the courses. This is how you will learn the most: sharing your knowledge and “teaching” to your colleagues. This is very important in the dynamic of the Master.

Reverse pedagogy: the teacher is not the only one to be active during a session, the students are also expected to contribute actively. Typically one session is organized according a process of iterative loops: the teacher deliver a content and stimulate the students, the group try to problematize an issue, the students are working in groups and they formalize a tentative answer, the students are giving a feedback to the teacher and vice-versa, the output is formalized and there is a reflexive debrief step at the end of the session.

Project-based learning: the students are often coming to the master EdTech with a project more or less structured, at least with an intention. They have the opportunity to develop their projects directly during the classes: teachers give the chance to the students to propose their project as case studies if it’s relevant for the class. Collaborative working is at the heart of the pedagogy in every course.

Problem-based learning: CRI pedagogy is framed by the Sustainable Development Goals of the United Nations. We believe that collective intelligence of the students at a global level can help to solve some of the biggest world’s problem. Some events like the CRI Summer Schools are directly organized to tackle these issues in collaboration with other universities around the world but it is also at the heart of the pedagogy at CRI on a daily basis.

Attendance

You are expected to attend every classes that you chose to follow and to be committed to our learning space, which means being here on time and contribute to the flow of the class.

A paper attendance sheet is in your classroom for all the course. Do not forget to sign it and to bring it back to the office. For each absence, we require from you to warn the master’s office ahead explaining the reason or to be able to give a proper medical certificate when you return.

More than two unjustified absences during the year can lead to a convocation with the whole Master Direction.

3.1 EdTech M1

The first year of the Master is designed to provide you :

- A global understanding of the digital transformation happening in education and its impacts on the society.
- A support to design a relevant and challenging research problematic or/and entrepreneurial project related to innovative education and learning society.
- A discovery of the scientific current approaches : field observation methods, quantitative and qualitative methods, evidence based method.

Indeed, to become a new actor of education in its broader meaning, your profile has to combine 3 skills-groups : ability to set up a research question, understanding of what stands behind the concept of project and entrepreneurship, and involvement in the current social innovation movement.

3.1.1 Planning and content of the year

- The academic year starts on Monday September 3, 2018
- Bootcamp : September 3 - September 21
- CRI Discovery days : October 4 & 5
- Internship validation commissions : November 26, December 12, January 15
- Deliverables / exams / last courses : up to each teacher
- Start internship : January 21
- Internship report deadline: June 7th
- Internship defenses : June 21 (to be confirmed)

Also, as a way to start each week, one representant of the coordination team will be at the beginning of the week to summarize with you the aspects of the past week and the one above, answer your questions and enhance common alignment and communication regarding the Master's schedule and the learning space objectives.

First Semester (September - January)

Bootcamp

The first semester starts by a 3 weeks-long bootcamp. The intent is to provide you with the framework (method, toolbox, strategy, vision of the ecosystem) you need to achieve your own trajectory in the Master. Moreover, since you all come from different backgrounds, we try to give you common practical knowledge to feed your experimentations. While some of the subjects might be familiar to you, others will probably be new and challenging. Luckily, you are part of an interdisciplinary crowd, so there should always be someone nearby who can help you out. This is one of the most important lessons at the CRI: **work together**.

The 4 weeks will take you through these various topics:

- **3-7 Sept** : Building Our Learning Space (S. Pène, A. Loueilh)
- **9-14 Sept** : Technologies In The Classroom: A Bit of Methodology for (M. Cisel, S. Pène, M. Bari)
- **17-21 Sept** : Research Practices, Open Talks & Testimonies (S. Pène, F. Zenasni)

After these 3 weeks we hope that you will feel involved in our master program, its goals and its vision, and that little by little, you'll feel part of it and eager to contribute.

After this bootcamp, several core courses will take place every week. You will learn the theoretical and practical concepts that are required to act for opening education, technology, science and research :

UE.1.1	Game Design for Learning (Mourdjén Bari, Anne Lautrou)	6 ECTS
UE.1.2	Learning by doing (Kevin Lhoste, Joël Chevrier)	6 ECTS
UE.1.3	Cognition & Learning (Franck Zenasni)	6 ECTS



UE 1.4	Research Design (Franck Zenasni)	6 ECTS
UE.1.5	Instructional Design (Matthieu Cisel)	6 ECTS
UE.1.6	Innovative pedagogy and learning society (Sophie Pène)	6 ECTS
UE.1.7	Open science and Citizen science (François Houllier, Ariel Lindner, Muriel Manbrini, Yann Le Cunff)	6 ECTS

You need to validate at least 5 courses, which means to have a final grade equal or larger than 10/20. Grades will be based on your attendance (courses and conferences), quality of your homework and success to the final evaluation. It goes without saying that **we do expect you to follow all courses and pass all exams**. For your final grades, only the 5 best ones will be taken into account.

Important: once you choose to register to a course, you have to to be present at all the sessions. A significant number of absences on the whole year will be taken into account on the jury's final mention regarding your diploma's issue.

Second Semester (February - June)

The second semester focuses on practical work. You have to spend **at least 5 months** in a research lab or any institution (company, startup, NGO, third place) dedicated to learning, training and/or the transformation of society. You will also have some mandatory events and courses at the CRI.

UE 2.1.	Philosophical Foundations As A Pathway To Social Sciences (Mélanie Heard)	6 ECTS
UE 2.2	Internship	24 ECTS

Regarding the second semester, you are free to follow the two courses proposed but have to validate only one regarding University. Of course, you can chose to validate both and then keeping the best grade to send for the average of the second semester. At the end of the year, you'll have to deliver an internship report to make the inventory of your missions and

achievements, but **most of all to assess your own work and address a problematic to your own field experience**. The idea of this final presentation is to build your own expertise and share it with the classroom and the jury, using tools and concepts provided during this academic year as well as the ones of your original background. Your work will be evaluated on the quality of your final report, oral presentation, graphic poster and tutor's grade and counts for 24 credits of the whole second semester.

3.1.2 Course details

UE.1.1 --- Game Design for Learning

Teachers : Mourdjen Bari, Anne Lautrou

Format : 30h (10x3h)

Evaluation : Continuous self-evaluation with setting goals at the beginning. Reflexion on which goal has been fulfilled or not, then setting new goals or adjusting older ones, so students can say, at the end, on what skills they have improved or not. An evaluation grid will be provided.

+ Testing key concepts over the semester

Language : English

Course goals and objectives:

- to know how to identify game design elements
- to understand their contribution to a learning path
- to design a learning sequence through play

Session 1 : educational games

Playing games and discussing whether they teach something to the player or not. Also, we'll study the different ways of using game design in an educational purpose so the students know the actors of this field and also the vocabulary to use to describe their productions.

Session 2 : skills within game creation

Using games but also creating them provides a wide range of skills. In this course, we'll see the different positions in a team of game prototyping and the kind of learning to get from them. The students will decide what aspect they want to learn the most and set goals for this UE.

Session 3 : brain and gameplay

Analyzing games, to learn what they are made of and why they are fun to play with. Meanwhile, we'll investigate the template game designers use to create games and the link we can make between learning and playing from the brain's perspective.

Session 4 : case study on how to use games in a classroom

Testimony of a teacher who uses the game in class (why, what for and how they do it) and discussion about the importance to know the target and also the context of use before creating a pedagogical sequence using game aspects.

Session 5 : learning goals

How to design an interactive experience while teaching a specific subject ? Together, we'll investigate the methodologies and the tools to design a project as complex as a serious game. In this part, we'll focus on the game loop and the definition of learning goals.

Session 6 : case study on how to gamify a learning path

Testimony of a learning designer using some elements of game design to improve the learning of the students on a MOOC, a learning application, a pedagogical tool, etc. Then talking about the effects on the motivation of the students. Intrinsic VS extrinsic.

Session 7 : learning path

How to design an interactive experience while teaching a specific subject ? Together, we'll investigate the methodologies and the tools to design a project as complex as a serious game. In this part, we'll focus on the learning path and the progression of the player.

Session 8 : case study on how to develop a serious game

Testimony of a game developer or a game development studio working on games that have a social impact on how and why they create games. Discussion on the way games are being political and what their business model is.

Session 9 : iterative process

How to design an interactive experience while teaching a specific subject ? Together, we'll investigate the methodologies and the tools to design a project as complex as a serious game. In this part, we will focus on the iterative process and the need for playtesting

Session 10 : no plans

Depending on the needs or the wishes of the students, we'll provide a presentation on the subject of their choice in the field of game design for learning. It can be a good time to talk more about a subject we already presented before, to discover a new one or to improve the prototype they worked on.

UE.1.2 -- Learning By Doing

Teachers : Joël Chevrier, Kevin Lhoste, Daniel Assayag

Contact information: joel.chevrier@cri-paris.org

kevin.lhoste@cri-paris.org
daniel.assayag@cri-paris.org

Format : 30h (10x3h)

Location: Maker Lab, CRI Paris.

Evaluation : Project Presentation.

Language : English.

Aim of course

The best way to understand the meaning of what you learn and to be able to combine theory and practice is to do it yourself (DIY). In the Makerlab, you have access to 3D printers, laser cutting machines and other devices which will enable you to develop use cases for your projects and to understand how user's experience can turn into a driving force in education. With a framework derived from the Sustainable Development Goals defined by UNO to end poverty, protect the planet, and ensure prosperity for all (<http://www.un.org/sustainabledevelopment/sustainable-development-goals/>), you will be asked to design a project fitting with one of the 14 goals listed and to document your ambition through an open source documentation in order to share your scientific and practical achievements.

Course content

- **Learning by Doing introduction (3h)** and inspiring talk about interdisciplinary learning by doing process
- **Pre-project (6h)** following the museographic project stages, students in project groups define the concept, the scale of the project, and their learning path expectations as they are experimenting on the technics they want to use.

After this session, mentors validate each project (the technical feasibility regarding the group skills, the relevance of the concept regarding the target, the planning and the research potential of the subject).

- **Project (3h)** Teams prepare a first project and a first prototype to present to the middle presentation. They have access to the Labs on thursdays on their extra time.
- **Project presentation (3h)** In front of a special jury, students present their project and a first prototype to make it validate and evaluate its potential.
- **Prototyping (6h)** in the Labs, students learn about the technics they need and experiment with it to achieve the goal of their project,
- **Learning by Doing epistemology (6h)** With the professor Joël Chevrier, students lead a reflection around their own learning by doing practice echoing with existing practices of Learning By Doing in different fields and different countries.
- **Final presentation (3h)** Opened to public, students present their concept and a tangible functional prototype proving the concept they want to promote.

An extra training on specific technologies is available during the holidays for interested students. Also mentors are available on thursday.

Learning outcomes

Exploring an innovative educational field with its content, its target and its main challenges,

- Building a planing and specifications for a technical project,
- Understanding the potential of new educational tools,
- Understanding the technical feasibility of a DIY project,
- Extracting and presenting the values of a concept.

Soft skills :

- Skills recognition in a team process,
- Reflexive thinking

Assessment

- Device 25%
- Process documentation 25%
- Presentation 25%
- Learning by Doing epistemology on learning by doing 25%.

The retake exam is either a presentation or an article, to be decided with the pedagogical team.

UE.1.3 --- Cognition and Learning

Supervisor of the course: Franck Zenasni

Teachers: Sebastien Goudeau, Gaell Mainguy, Charlotte Salvatico, Felix Schoeller and Franck Zenasni

Format: 45h (15 x 3h)

Evaluation: a mid-term exam and a collective/individual report

Language: English

Objectives and description: The aim of this course is to help student to understand the basics of cognition and how they can be related to learning and education. At the end of the semester, students should be able to read, understand and analyse works and researches dedicated to the study of cognition in education and learning sciences.

Keywords: cognition, metacognition, learning, psychology, cognitive sciences, education, intelligence, personality, emotion, skills, abilities

Recommended media: www.iqscorner.com/

Grading: a mid-term exam and a collective/individual report.

Schedule of classes: Tuesdays: see the dedicated google classroom (subject to change/adjustments)

UE.1.4 -- Research Design (/Design Studies)

Supervisor of the course : Franck Zenasni

Teachers: Matthieu Cisel, Amelia Legavre, Macarena Paz-Celume, Sophie Pène, Perrine Poupin, Franck Zenasni

Format : 30h (10x3h)

Language: English

Objectives and description: This course is an introduction to systematic literature review and research design. Concretely, student will be initiated to (a) the levels of evidence in learning science researches and education (b) the different types of research methods and their principles, (c) the making of a scientific literature review in learning sciences (using databases), (d) the collection of quantitative versus qualitative data. This program should allow student to understand how to read research papers, how to write research projects in learning sciences with relevant rationales and literature reviews. All knowledge and skills learn in this course will be used in other courses such as CARA (M2) and the master thesis project over the 2 years of the Master (*on this matter, see Master 2 section*).

Keywords: Science, research, quantitative data, qualitative data, evidence-based practice, scientific papers, databases, scientific references, evidences, type of researches

Recommended readings: At each class teachers will recommend a main text (scientific paper, chapter or book) that is highly recommended to read.

Grading: a mid-term exam and a final project report of 5 pages. (subject to change/adjustments):

Schedule of classes: Tuesdays: see the dedicated google classroom (subject to change/adjustments)

UE.1.5 -- Instructional Design And Online Learning

Teacher : Matthieu Cisel

Format : 30h (10x3h)

Language : English

The course will be divided in **two parts** : *How to design an online course*, and *How to design an educational app*. Each part will include 6 to 7 hours of lectures.

Part 1 - How to design an online course

At the end of this course, the student should be able to :

- Know what the main forms of online learning are
- Know what the main steps of designing a course are
- Master the tools required for project management
- Design the objectives of a course
- Deal with most important intellectual property issues
- Design a short instructional video
- Manage pedagogical content within an online platform
- Master most important evaluation strategies
- Understand the basics of learning analytics

Part 2 - Design an educational app

At the end of this course, the student should be able to :

- Know the typology of educational technologies
- Do a proper benchmark and establish a business model
- Know how to collect user needs
- Take into account existing research
- Design Scenarios
- Design user-friendly interfaces
- Write down specifications for a developer
- Follow a rapid prototyping approach and perform user tests

Assessment

The remaining 15 to 17 hours will be dedicated to the realisation of two small group projects in both course design and technology design, on the topic of their choice. If they lack inspiration, the instructor will provide actual projects to work on for the duration of the course. Students will be assessed based on group projects, and through an individual exam. There will be a small project, and a larger project.

Common core

Course design : all groups will have to write the outline of a course, design a video, a short evaluation and show that they can master a learning management system.

Designing an educational technology : all groups will have to write down a description of their technology, carry out a short benchmark, design a few interfaces, and perform user tests.

Specializing

The students will work in groups and will have to choose a major between course design and technology design. Depending on their choice, they will have to do the following extra-work
Course design : The students will have to design more multimedia, communication strategies, follow a hybrid learning approach.

Designing an educational technology : Write down specifications for developers using both sentences and diagrams. Reflect upon the back-end architecture and the design of learning analytics. Develop a prototype of a feature of the app

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UE.1.6 --- Innovative pedagogy and learning society

Teacher : Sophie Pène

Format : 30h (10x3h)

The course includes: lectures (issues presentation, bibliographies, scientific papers) ; reverse pedagogy (iterative loop between students and teacher as a facilitator) ; case studies & collective research.

Language : English

Course goals and objectives

You share the desire to have a positive influence on modalities, places, policies and actors of institutions. This course starts from the study of innovation in pedagogy, as a paradigm for discourse and action. It aims to develop critical approaches, analytical tools and project spirit to move towards "change making" but with conceptual and methodological knowledge assets and the acquisition of case studies. If innovation seems to be a current condition in today's projects and discourses, it is important to be able to identify, describe and qualify innovations. We will make it together, as an outcome of your work, readings, discussions, for the best impact of your future projects and internships.

The course is related to the field of learning sciences. It offers a two-pronged approach to the notions of innovation and pedagogy. On the one hand, it provides the class with a critical analysis facing the injunction to innovate that the public policies now express. On the other

hand, it also proposes to reinforce the concrete knowledge of so-called innovative practices. Regarding the learning sciences field, the choice is to study "Innovation in pedagogy" from interdisciplinary research streams in 3 main ways:

- a) building crossed methods that contribute to the understanding of the topic;
- b) considering the ways in which digital processes are changing both notions of innovation and pedagogy;
- c) exploring a set of experimentations by data coming from field observations, discourses analysis, research interviews and case studies.

Learning outcomes:

This course will help you :

I. Identify and classify transitions in education based on the following resources :

- Analysis of discourses on innovation in public policies (by the contents of official documents and reports), discourses on the notion of change and the introduction of experimentation as a "*right for teachers*" enshrined in official circulars;
- Institutional competition, and emerging alternatives related to popular education, social entrepreneurship, NGOs, personal initiatives, philanthropic portages, investments by education industry groups;
- Impact of globalized movements (mediations, philanthropy and lobbies) in the transnational ideas flow.

II. Focus on the digital transition

We will focus our observations and analyses on few factors:

- the availability for all of huge structured and unstructured databases;
- the spread of a "posture" of learning, all the time and everywhere, based on a systematic "request" for information, its verification and sourcing;
- the substitution of classical learning places into open learning ecosystems as spaces for coworkers, collaboration, events, knowledge sharing and

We will take into account the systemic effects of these transformations on educational institutions and its actors (teachers, families, entrepreneurs, politicians, media, society). Thus, we will discuss the "disintermediation" of education.

III. Focus on a personal project

Each student has to define a focus on a research question or a prototype from case studies regarding either :

- a) individualization and inclusion process, and possibilities coming from apps, postures or knowledge to give answers for disabilities and singularities (exceptional children, dyspraxics, dyslexics, hearing impaired, visually impaired, persons with autism);
- b) lifelong learning.

Validation

The validation of the course is based on three achievements:

- state of the art: group presentation or document analysis (scientific paper, report) according to a defined template;
- analysis of an educational situation as stated in III.
- writing a summary of your path of learning, with resolved questions, unresolved questions and new questions, as a prerequisite for a more personal project (it can be prototyping, internship, intervention, research, professionalization...).

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- VAN ZANTEN, Agnès. *Les politiques d'éducation*. Presses Universitaires de France. Que sais-je ? 2396, 2014.

Data sharing

- « Data Sharing and the Future of Science ». *Nature Communications* 9, n° 1 (19 juillet 2018): 2817. <https://doi.org/10.1038/s41467-018-05227-z>.

Resources

- « Education and Skills ». World Economic Forum. <https://www.weforum.org/agenda/archive/education/>.
- « Fondation Bill et Melinda Gates ». Gates Foundation. <https://www.gatesfoundation.org/fr/>.
- « Global Corruption Report: Education ». Transparency International. https://www.transparency.org/gcr_education.
- « IIE: The Power of International Education ». <https://www.iie.org/443/en>.
- « Institut Montaigne ». <http://www.institutmontaigne.org>.
- « Nesta » <https://www.nesta.org.uk/>.
- « RAND Corporation Provides Objective Research Services and Public Policy Analysis ». <https://www.rand.org>.
- « The future of education, according to experts at Davos ». World Economic Forum. <https://www.weforum.org/agenda/2018/01/top-quotes-from-davos-on-the-future-of-education/>.

UE.1.6 --- Open Science and Citizen Science

Supervisor of the course : Muriel Mambrini

Teachers of the course: Ariel Lindner, François Houllier (to be confirmed), Yann le Cunff

Format : cycle of conferences + course

Language : English

Please note that the conferences by Muriel Mambrini (IHEST), Ariel Lindner (INSERM) and François Houllier (IFREMER) have to be scheduled. The topics of their talks will be communicated during the first semester. The course of statistics comes as a practical addition to these inspirations - for the conferences and the statistics courses, two evaluations will be driven for the global average of the course.

UE.1.6.1 - Citizen Sciences, Digital Transition and Education (*conferences*)

Lecturer : François Houllier

Format : 3 hours for each conference

Language : English

Summary: During the last decade, citizen sciences, also termed 'participatory sciences' in French (*sciences participatives*), have experienced strong growth. They have thus become a major component of the so-called 'Science-Society Dialogue'. The conference will reflect on this rapid development, give an overview of participatory sciences in France, and situate them within the broader context of 'Science With and For Society' policies. The conference will then invite the students to reflect on three different questions related to this fast development:

- Are data and digital technologies at the heart of the rise of citizen sciences?
- What ethical approach to ensuring "good practices" when the public and the civil society interact with professional researchers to produce new scientific knowledge?
- What is, and could be, the role of participatory sciences in education and training at different stages of life?

The conference is based on a report submitted to the French government in February 2016. One of the distinctive features of the report was to include a study of participatory sciences at school. See: <http://www.sciences-participatives.com> for the full account of this work, and <http://www.sciences-participatives.com/en/Report> for the English version of the summary of the report.

Following the conference, the students will be invited to:

Supplement the inventory of what is being done in France or in the world on citizen sciences at school or in secondary school (ie, considering citizen sciences as a support for training in different disciplines or as a learning method);

Start the inventory of what is being done in France or in the world on citizen sciences at university (in the broadest sense), considering that this issue remained a blind spot (albeit paradoxical) in the February 2016 report and that citizen sciences could contribute to the third mission of universities;

Initiate an inventory and a reflection on the particular aspect of citizen sciences of education (ie, which participatory approaches to advance knowledge on pedagogy at different levels?), which is another blind spot of the February 2016 report.

UE.1.6.2 --- Introduction to statistics for social sciences (Yann Le Cunff)

Teacher : Yann Le Cunff

Format : 9 hours either of Level 1 or Level 2

Evaluation : The evaluation is a time-limited exam on a computer, during which each student has to perform the analysis of a dataset.

Language : English

Course objectives and goals

This course aims at providing students with the essential tools of data analysis. At the end of the level 1 sessions, students will be able to structure basic datasets and carry on key statistical analysis (namely, comparing averages, testing for correlations or using chi-squared tests) using the open software R and its user-friendly interface Rstudio. Level 2 of this courses focuses more on data visualisation, projection (especially PCA) and clustering of dataset (e.g. hierarchical clustering). In order to attend the second level, students are encouraged to get familiar with the R environment, as well as with the basics of data analysis. Students can follow both levels of the course or only one, and validate the most relevant level for them regarding their own assessment of their knowledge in statistics.

Key competencies to be acquired in this course :

- From intuition to data analysis. And vice versa.
- Datasets are everywhere, learning how to handle them is, in itself, enough to suggest new ideas, products, ... Yet, this requires more advanced methods (e.g. Machine Learning) of which the present course is a (really modest) introduction.

Keywords: statistics, data analysis, R software

Recommended readings: For French reader “*Statistiques pour statophobes*” is a nice way to discover the statistical analysis approach. But there is no pre-requisite for the level 1 course.

UE.2.1 -- Philosophy As A Pathway to Social Science

Teacher : Mélanie Heard

Format : 30h (10x3h)

This course will function as a seminar. Students will be doing a lot of presenting in class, mainly individually , and will be expected to participate regularly in the class discussions.

Language : English

Aims / competencies :

The course aims to strengthen the foundations of a research attitude among students; In contrast to a spontaneous posture, the posture of the researcher requires a methodical interrogation of the concepts and practices that shape the objects of research - here the main current educational policies and practices. The course will draw on classical texts from the philosophy of education to nurture a critical reading of current trends in educational research.

Learning outcomes:

- to examine critically the reasoning behind common educational policies and practices ; to examine the assumptions these policies and practices make about human nature, knowledge, and society ;
- to become familiar with the philosophical background of main educational policies ;
- since these educational practices and policies will be approached through research paper supporting their views : to improve student’s critical thinking skills regarding research production. Critical thinking skills involve the ability to reason, to assemble evidence in order to develop a position, and to communicate complex ideas. You will work on your ability to analyze the way a research questioning is built, designed and interpreted ; to detect, while reading a research paper, what conceptual framework are used as backgrounds, to notice if a claim is not sufficiently backed up on evidence, and to decide why accept or reject an information, hypothesis or assumption,

Materials : we will systematically read together classic philosophical texts on education (ex. Plato, Aristotle, Rousseau, Dewey) and some contemporary materials from social science research on education, reference papers supporting main trends in educational research and policies.

Graded work:

1. Reading presentation (philosophy): each student will give a brief presentation on a short section of assigned reading ;

2. Article reviews : each student will choose and present a book or article ;
3. Exams :
 - one exam will take place before the course starts (december, e.g. dec 18), as a tool to share an overview student's competencies and teacher's requirements but with no grading impact ;
 - final examination at the end of term ;
 - for both students are required to write an essay during 4 hours on a philosophical notion regarding education ; students will write compositions that are well developed, organizing ideas effectively (introduction/support/conclusion), establishing a narrowed and sophisticated main content and focused ; students will use in the final term essay several references used during the sessions.

Presentations : 20% each (total: 40%)

Final examination: 40%

Discussion, attendance and participation: 20%

UE.2.2 --- Internship

The internship won't be full time. You have to come at CRI **one Friday afternoon per week for courses and mentoring** and on some the evenings where the mandatory masterclasses will be scheduled.

Your internship should ideally consist in a defined project that will lead to results within the 5 months period. It runs from the end of January to the end of June, but this can be subject to individual changes as long as the internship lasts **5 months at least**.

This is an important step of your research training. Basically it means that you have to follow several steps :

1. Be able to found an observation of your working environment and justify your assumption through qualitative/quantitative methods.
2. Frame a problematic
3. Explore literature and other resources (articles, interviews, observations...)
4. Design a modest research protocol including data : field experience (comparison, pre/post-test...)
5. Lead an analysis
6. Share it & publish it.

As said above, **by June the 7th**, you will have to deliver an internship report to make an inventory of your missions and achievements and, most of all, to assess your own work and address a problematic related with your field experience. The idea of this final presentation is to build your own expertise and share it with the classroom and the jury, using tools and concepts provided during this academic year as well as the ones of your original background.

Please note that we strongly advise you to try finding an internship in a research laboratory. This is an essential step in your training. If you're more interested by an internship conducted in a school, a start-up or a company, the topic has to include aspects **of research, experimentation and creativity**. **When getting in touch with a possible hosting organization**, do not forget to give more information to your interlocutors : on the meaning of your cursus, your projects and the specific pedagogy of the Master. A specific workshop in late October should help you with introducing yourself to the institutions you are targeting and to get more familiar with the French legal framework and administrative paperwork regarding internships.

3.1.4 Seminars and masterclasses

CV Lab

At specific times of the year, the CV Lab consists in order to document your own trajectory in the Master. This project, initiated and operated by Sophie Pène and external partners (leaders and representatives of labs of innovation and companies, startups focussed on student e-portfolios and open badge translation of skills, experience and know-how), aims at giving its participants the tools and habit to take good notes of their own achievements in terms of knowledge, skills and realisations. By taking the habit to document your own path and to turn it into data, you will be able to design and visualize your own field of research and action coherent with your background, personal problematic(s) and professional purpose as well as to draw the Master's key elements and landscape. Thus, this along-the-year documentation and meetings with stakeholders of lifelong learning and professional training will also feed the recurring question : what are the jobs of the futures? What inspirations, which stakes, which challenges, is currently them?

Evening courses

Apart from the mandatory courses, teachers and students have the possibility to suggest and propose evening courses, starting during weekdays from 4 to 7 pm. These courses are meant to be open to all people of the LMD Program (Bachelor-Master-FIRE Doctoral School) and to be transversal. They will be announced soon but so as you can have an idea of the first ones announced, there will be course thematics such as "Cognition, Learning and Technology"



(Franck Zenasni and guests) following and expanding the topic of his core course (UE 1.3), “How To Organize a Congress Upon Learning Sciences” (Franck Zenasni) and “How To Prepare a Scientific Presentation” (Matthieu Cisel). In early October, a general meeting will occur to give general info about the first courses, their timeline and settings. Keep in mind that these courses won’t lead to a validation and are open complementary to your academic training.

Medium Publication

Throughout the year, you will discover many horizons, new problematics, new challenges. In the EdTech Master, we do think that these issues have to be shared and spread, and that it’s the voices of the students which matter the most. That’s why you’re expected to write personally **at least 1 article each** for our Open EdTech Medium publication. If you have any doubt or want to discuss your topics and perspectives, you can solicit the Master’s coordinators advice.

Masterclasses

On a monthly basis, an expert in digital education, entrepreneurship, learning sciences or user design comes to explain her/his career path, and the important scientific and/or entrepreneurial questions which she/he is interested in during one hour talk. This is followed by an informal buffet with the students, where you will have the opportunity to freely ask questions and interact with the speaker. Attendance to your program’s masterclass is mandatory, and you are most welcome to the masterclasses of the other programs as well (AIV masterclasses, FdV Interdisciplinary Fridays).

3.1.5 What is after M1?

At the end of the Master 1, and given that you have successfully passed all exams, we will discuss with you the opportunity for you to continue with us in the second year of the Master (M2). Usually, all students who want to continue in the EdTech program can do so. However, if you prefer to switch to another Master program that is more specialized and focused on your favorite research topic, we will help you to make the transition.

3.2 EdTech M2

The second year of the programme starts with one introductory session before the one week workshop called “Creating an Interdisciplinary Research Project” (CIRP) which will take place at Domaine de Chalès (Sologne) with the AIV M2 students and the 1st year PhD students (<https://cri-paris.org/doctoral-school-fdv/fellow-seminars/creating-interdisciplinary-research-projects-workshop/>). .

Then, the year mainly consists in **two internships for a total duration of 9 months** and mandatory courses at CRI. The courses and mentoring take place this year **every Friday afternoon** and during a **two-week workshop break from January 7 to January 18**. Apart from courses, the students are also required to participate in the regular Master classes which usually take place in the evenings.

3.2.1. Planning and content of the year

Beginning of the year first meeting: September 7, 2018

CIRP Workshop: 9-14 September, 2018

Internship I validation commissions : September 6, 17, October 1

Internship I : starts maximum on October 2

CRI Discovery Days : October 4 & 5

Deliverables / exams : up to each teacher

Internship I defense : February 15, 2019

Internship II validation commissions : December 12, January 15, February 12 2019

Rehearsal for the FdV PhD application : current April 2019

Internship II defense : June 14 2019

Third Semester (September - January)

UE 3.1	Creating An Interdisciplinary Research Project	6
UE 3.2	Critical Analysis of Scientific Approaches of Learning	6
UE.3.3	Internship I	12

For the first semester of M2, the students can choose to follow the M1 courses instead of making their first internship. Then, they can follow as many courses as they want to, but **have to validate only 2 courses**. You can also choose to validate more than 2 courses, in this case the 2 best grades will be taken into account. **In either case, each M2 student has to follow the M2 mandatory courses.**

Fourth Semester (January - June)

UE 4.1	Research Project	6
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UE4.2	Design, Creation and Evaluation of an Innovative Project (DECEIP)	12
	UE4.2.1 Why And How Generating New Ideas?	6
	UE.4.2.2 BioDesign Challenge	6
	UE 4.2.3 Entrepreneurship Week	6
	UE 4.2.4 An Initiation To Participative Research	6
UE 4.3	Data and education (<i>ex Review on Pedagogical Innovation</i>)	6
	UE 4.3.1 Introduction to statistics for social sciences (Yann Le Cunff)	3
	UE 4.3.2 Introduction to data science (Benoit Praly, Ivan Ostrowitz)	3
UE4.3	Research Project	6
UE4.4	Internship II	12

3.2.2 Course details

UE 3.1 Creating An Interdisciplinary Project

Course coordinator: Stéphane Douady

Schedule: September 9-14 2018

Overview:

The workshop, set in domaine de Chalès in Sologne, intends to assemble free spirited students, and researchers from broad scientific backgrounds to conceive creative projects at the interface with Life Sciences and Learning Sciences. This year will combine newcomer students of the FdV PhD program, 2nd year AIV master program, 2nd year EdTech master, and will host students of the 1st year AIV master program and EdTech master.

The CIRP workshop attempts to provide the primary basis for collegiality and communication through dialogue and brainstorming on open questions in Life Sciences, Education Design, Entrepreneurship.

Course objectives:

- » To be able to focus on an important question and to define the means to approach it from different angles
- » To be able to zoom out (have a broader view) and zoom in (be precise and define the key points)
- » To think and express your ideas more clearly.
- » To gain confidence in your ideas.
- » To be able to discuss, reject or accept ideas.
- » To learn to take constructive scientific criticisms
- » To learn how to write a research proposal.
- » To discuss questions thoroughly.
- » To learn to interact with people from different backgrounds.

UE.3.2 --- Critical Analysis of Scientific Approaches of Learning

Teachers : Marguerite Benony, Matthieu Cisel, Ke Fang, Anirudh Krishnakumar, Mélanie Heard, Amelia Legavre, Macarena Paz, Perrine Poupin, Franck Zenasni, Sophie Pène.

Format: 30h (3x10h)

Language : English

Course objective :

Develop the student's ability to read and critically interpret papers from high quality journals. Through this exercise the students will be exposed to a large spectra of interdisciplinary research domains and methodologies.

Develop the student's ability to prepare and present a scientific talk (in English). Emphasis will be given to the talk's structure, slides, interaction with the public and scientific language.

This course is built of a series of seminars, each prepared by two students from different backgrounds, presenting in detail an interdisciplinary research paper of their choice. The underlying hypothesis, background and the results is discussed in detail and the different techniques explained. In addition, the students are asked to suggest further experimental/modeling approaches with respect to their conclusions from the paper at stake. All students are expected to participate in the course forum, contributing with their insights and questions on the article at hand.

Learning outcomes

- Develop the ability to read and critically interpret papers from high-quality journals. Through this exercise, the students will be exposed to a large spectrum of interdisciplinary research domains and methodologies.
- Develop the ability to prepare and present a scientific talk.

Recommended readings:

Critical reading, advices of Walden University

<https://academicguides.waldenu.edu/ASCsuccess/ASCcriticalreading>

Critical reading

<http://advice.writing.utoronto.ca/researching/critical-reading/>

Writing an annotated bibliography

<http://advice.writing.utoronto.ca/types-of-writing/annotated-bibliography/>

To create a bibliography, and citing sources

<https://guides.library.utoronto.ca/c.php?g=251103&p=1673071>

Recommended media

How to review a journal paper, or give other scientific, technical presentation, by Seppo Karrila:

<https://fr.slideshare.net/Skarrila/how-to-review-a-journal-paper-and-prepare-oral-presentation>

How to read a scientific paper

<https://www.elsevier.com/connect/infographic-how-to-read-a-scientific-paper>

Grading and Assessment

The students will be asked to prepare three deliverables:

- A writing presenting the anatomy of papers (background of the author and question, hypothesis lead in the article, experimentation and data used, core of the discussion and conclusion);
- A presentation through slides using comparative approaches to open the oral discussion;
- An oral and short synthesis after the course through a P2P review, feedback after each presentation.

Each document have to be published in the Folder M2 Shared Folder CARA Presentations.

UE.4.1 --- Research Project

Trainers : Nicolas de Chnaud

Format : 30h (10x3h)

Language : English

Description

This course propose to acquire the “scientific approach” for education projects. You will have to write a pedagogic research protocol in order to prove effectiveness of an educational method. This course will combine theoretical and project-based learning.

Prerequisite

Theoretical knowledge of research methods in education (“Research Design” during master 1).

Learning outcomes

At the end of this course, learner will know how to build a research protocol, notably in qualitative and quantitative research.

At the end of this course, learner will have written a pedagogic research protocol

Assessment

At the end of the course, learner will present their research protocol to a jury.

They will be noted by a lettre (from A to F). This note will include attendance, project’s interest, quality of research method, orale presentation.

Bibliography

- Louis Cohen, Lawrence Manion, Keith Morrison (2017), *Research Methods in Education* (8th Edition), Routledge (6th edition available online for free);
- Aaron Cooley (2013) Qualitative Research in Education: The Origins, Debates, and Politics of Creating Knowledge, *Educational Studies*, 49:3, 247-262 (available after connecting to www.biusante.parisdescartes.fr)
- Paul Connolly, Ciara Keenan & Karolina Urbanska (2018) The trials of evidence-based practice in education: a systematic review of randomised controlled trials in education research 1980–2016, *Educational Research* (open access article)

UE 4.2 Design, Creation and Evaluation of An Innovative Project

During the first two academic weeks of January, ie. **January 7th and 14th**, a set of 4 workshops will be suggested to your choice. You have to validate **two of them** on the basis of your personal interest and training regarding the field you want to highlight through your internships and validated courses. Their content, objectives and outcomes will be presented to you during November so that you can register ahead of their openings, but their topics by now are:

- Project creation and entrepreneurship (Margaux Pelen)
- Creativity Fostering & Trends For Learning (Franck Zenasni)
- BioDesign Challenge : New Frontiers of Learning (Marguerite Benony)

- An Initiation to Participatory Research (Sophie Audidière, Raphaël Duboz)

UE 4.3 Data and education

UE 4.3.1 --- Introduction to statistics for social sciences

Teacher : Yann Le Cunff

Format : 9 hours either of Level 1 or Level 2

Evaluation : The evaluation is a time-limited exam on a computer, during which each student has to perform the analysis of a dataset.

Language : English

Course objectives and goals

This course aims at providing students with the essential tools of data analysis. At the end of the level 1 sessions, students will be able to structure basic datasets and carry on key statistical analysis (namely, comparing averages, testing for correlations or using chi-squared tests) using the open software R and its user-friendly interface Rstudio. Level 2 of this courses focuses more on data visualisation, projection (especially PCA) and clustering of dataset (e.g. hierarchical clustering). In order to attend the second level, students are encouraged to get familiar with the R environment, as well as with the basics of data analysis. Students can follow both levels of the course or only one, and validate the most relevant level for them regarding their own assessment of their knowledge in statistics.

Key competencies to be acquired in this course :

- From intuition to data analysis. And vice versa.
- Datasets are everywhere, learning how to handle them is, in itself, enough to suggest new ideas, products, ... Yet, this requires more advanced methods (e.g. Machine Learning) of which the present course is a (really modest) introduction.

Keywords: statistics, data analysis, R software

Recommended readings: For French reader “*Statistiques pour statophobes*” is a nice way to discover the statistical analysis approach. But there is no pre-requisite for the level 1 course.

UE 4.3.2 --- Introduction to data science

Teacher : Benoit Praly, Ivan Ostrowitz

Format : 18h (6x3h)

Evaluation : to be determined

Language : English

UE 3.3 & 4.4 - Internships

In Master 2 you have to do two internships of a total duration of 9 months.

There are several rules to follow :

- **Each internship isn't full time. You have to come at CRI each Friday afternoon for courses, mentoring and master classes.**
- Your internship should ideally consist in a defined project that will lead to results within the 4 to 5 months period (depending on how long are the 2 internships of your choice).
- You have to do your two internships **in two different organisations.**

Please note that the quality of your internship depends of various factors :

- We strongly urge you to try finding an internship in a research laboratory. This is an essential step of your training.
- Even when the internship is conducted in a school, a startup or a company, **the topic has to include aspects of research, experimentation and creativity. When getting in touch with a possible hosting organization**, do not forget to give more information to your interlocutors : on the meaning of your cursus, your projects and the specific pedagogy of the Master. A specific workshop in late October should help you with introducing yourself to the institutions you are targeting and to get more familiar with the French legal framework and administrative paperwork regarding internships.

3.2.4 Seminars and masterclasses

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with stakeholders of lifelong learning and professional training will also feed the recurring question : what are the jobs of the futures? What inspirations, which stakes, which challenges, is currently them?

Evening courses

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Medium Publication

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Masterclasses

On a monthly basis, an expert in digital education, entrepreneurship, learning sciences or user design comes to explain her/his career path, and the important scientific and/or entrepreneurial questions which she/he is interested in during one hour talk. This is followed by an informal buffet with the students, where you will have the opportunity to freely ask questions and interact with the speaker. Attendance to your program’s masterclass is mandatory, and you are most welcome to the masterclasses of the other programs as well (AIV masterclasses, FdV Interdisciplinary Fridays).

3.2.5 Beyond M2

Throughout the year, during the internships and various interactions with the CRI community, you have been exploring what you like, and hopefully, you have gotten an idea of what you would like to do next. Approaching the end of the year, you have to decide what you will do after the M2. The EdTech staff and the M2 teachers will help you find your way, so do not hesitate contact us.



Note that if you know beforehand that you would like to pursue a PhD, you have to choose your internships such that your chances for a PhD are maximized.