

Education: from master student to tenure

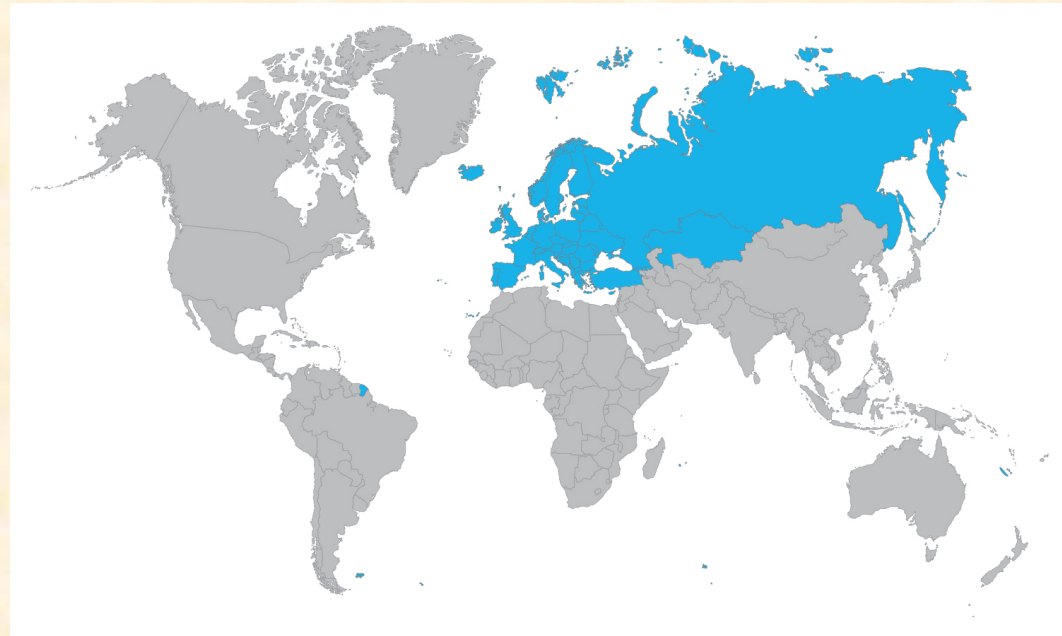
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Higher education in Europe

- Education in Europe has been restructured following the 1999 Bologna declaration.
- This has led to the European Higher Education Area (EHEA).
- ApPEC/ECFA/NuPECC countries are part of the EHEA.
- Members must sign the 1954 European Cultural Convention (under the authority of the Council of Europe).
- The EHEA currently has 48 members (+ the European Commission): All 47 Council of Europe members + Belarus.



The Bologna process

- Studies in the EHEA are organised according to a 3 cycle system: 3+2+3.
- This follows suit to the 1998 Sorbonne declaration to uniformize higher education in Europe and the 1998 Bologna declaration.
- It is often called the “Bologna process”.
- In the EHEA students are awarded credits for successfully attending a course.
- These credits are called ECTS (European Credit Transfer and Accumulation System).
- Emphasizes Academic Freedom and Institutional autonomy.



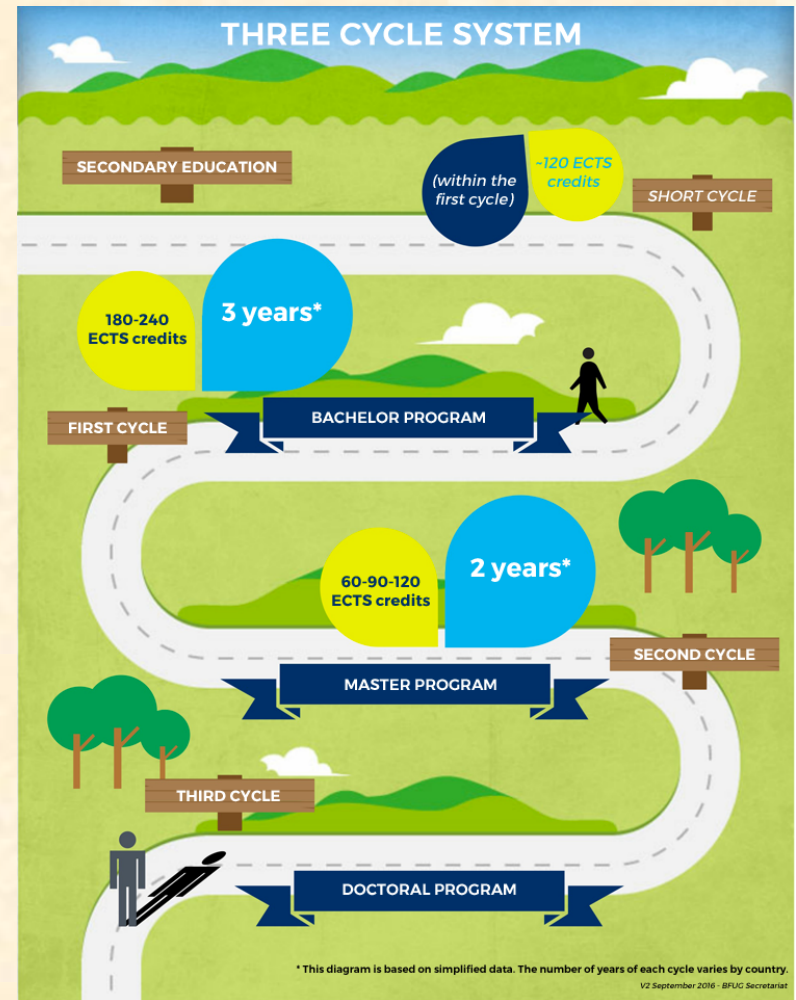
Common grading scale

- To allow an easier exchange of marks between countries, a common grading scale has been defined (to be used in exchanges of Marks between countries).
- This gives the relative performance of a student within a group but does not allow comparison of two students examined at different Universities at the reference groups are then different.
- Universities retain their grading procedures.
- This scale can be replaced by given the statistical distribution of the local grades.

Grade	Percentage	Percentile
A	10%	10%
B	25%	35%
C	30%	65%
D	25%	90%
E	10%	~100%
FX		Fail: additional work required
F		Fail: considerable work required

The three cycle system

- One academic year corresponds to 60 ECTS credits, equivalent to 1,500–1,800 hours of study.
- At the end of the first cycle, “bachelor program” (3 years of studies) they will have earned between 180 and 240 ECTS.
- They will then earn 60-120 credits in the second cycle “master program”.
- The third cycle is called the “Doctoral program” there is no set number of ECTS to earn during that cycle.



Education to our fields across Europe

- During the first cycle (Bachelor program) students learn general physics.
- In research intensive universities they will usually have the opportunity to get some initiation courses to some advanced topics.
- The master program is the time when they really specialise in advanced physics topics and thus thus is when they have solid courses in our topics.
- The availability of specific courses depends on local research groups working on these topics.

Specialization in the master program

- Most students arrive in the master program unspecialized.
- They will specialize during the master program by taking speciality courses.
- Specialization can occur:
 - At the beginning of the master, with all courses oriented toward a specific topic.
 - During the second year of master with the first year being generic and the second highly specific.
 - At the end of the master with a general physics courses and a few specialisation courses during the master {this seems to be less and less frequent}.
- Most research masters include a master thesis during which the student joins a research group for several months (up to a year).
- In some cases the master course is generic with specialization courses and in other cases the master course is already partly specialized.
- Given the autonomy of the universities, this is university/faculty specific.

Education during the doctorate

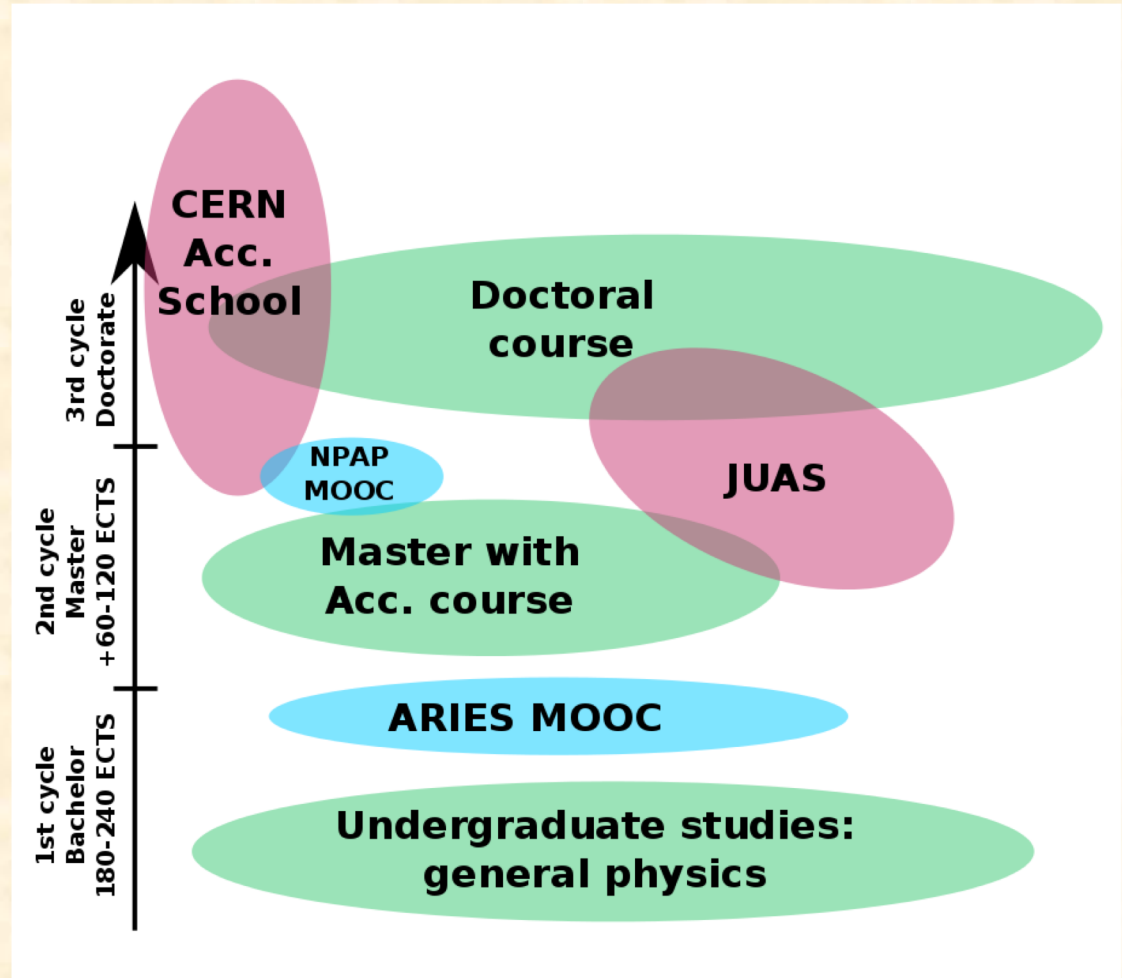
- The Bologna process does not require formal courses at the doctorate level.
- However almost all universities require students to attend some courses. They can take several forms:
 - Research seminars/paper discussion
 - Classroom courses without examination
 - Classroom courses followed by an examination
- In addition to courses in the field of specialization, most universities require student to take other courses:
 - Thesis writing
 - English
 - Ethics
 - Pedagogy
 - ...

Specialization schools

- Most universities don't have specialists in all topics of our fields.
- Hence students are often encouraged (required) to join specialized schools organised by leading institutions in the field.
- Examples:
 - CERN Schools (HEP, accelerators, computing,...)
 - ESI's schools (JUAS, ESIPAP)
 - Schools organised by local groups

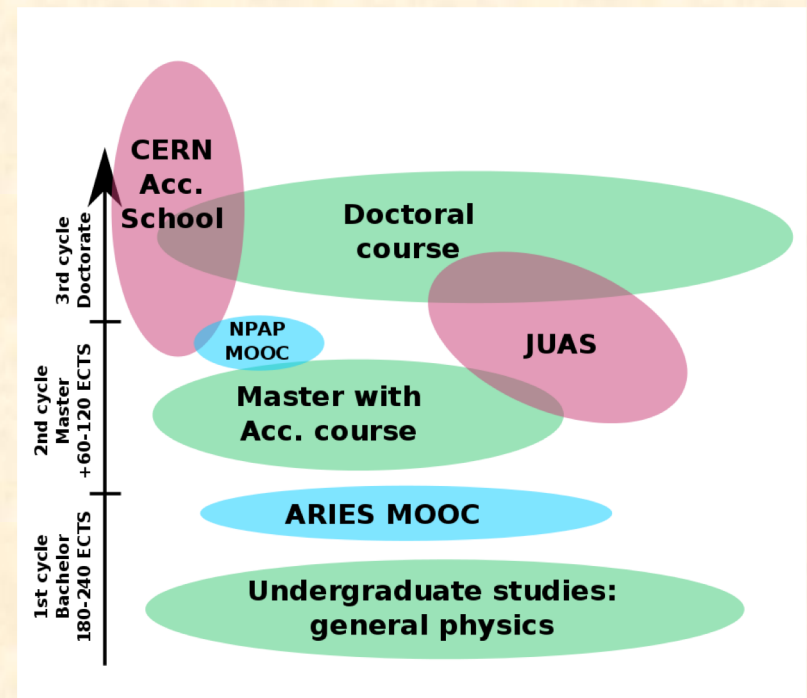
Example: The accelerators education landscape

- As an illustration we can look at the landscape for accelerators education.
- Accelerators have the specificity that there are very few lecturers in the field and thus few universities giving courses.
- This reinforces the need for joint schools at master and doctorate level.



Education in the digital age...

- Modern students spend a significant time on screens.
- It is tempting to use screens to teach them.
- Massive Online Open Courses (MOOC) are a good way to reach students in universities where some specialities are not given.



Teaching with MOOCs

- With MOOCs one can disseminate courses to a large number of students.
- The interaction with students is different than with conventional classroom courses.
- There is a wide range of feedbacks (from students and teachers) from highly positive to more sceptical.
- In experimental fields there is still the need to provide hands-on experimental training.
- In all fields the MOOC can help to attract students to a given topics.
- They also give more time to the teachers to focus on more difficult concepts.

Doctorate examination

Doctorate examination are also very different from university to university or from country to country...

Country	Step 1	Step 2	Public defence	Questions scope
France	2 external reviewers	Public defence with 4-8 examiners	Yes	Manuscript
Germany	Reviewers (supervisor + externals)	Defence with committee (can be public)	Yes/No	Physics
UK Ph.D. vs D.Phil.	Defence with 2 reviewers (internal + external)		No	Manuscript
Belgium, Romania	Pre-defence (closed door)	Public defence	Yes	Manuscript
Sweden	Nailing of the abstract (public release)	One to one examination in front of committee	Yes	Manuscript
Italy		Defence with committee, same for all students of the faculty	No	Faculty

From doctorate to tenure

- Although some institutions used to appoint young doctors to a tenured position immediately after the doctorate (or even before), this is no longer the case.
- In most research intensive institutions the average age to get a tenured position is beyond 30.
- European regulation prevent anyone renewing a temporary contract with an employer for who they already worked 6 years
=> most institution have stricter regulations.
- Some institutions have tenure track positions where a temporary contract will lead more or less certainly to a permanent contract.
- Other institutions operate on an open competition basis.
- In some institutions local candidates are not allowed to compete to open competitions.

Tenured positions

- The characteristics of the research in our field has some impact on the type of tenured positions.
- Most countries have national research institutions (IN2P3, INFN,...) or research labs (CERN, DESY,...) giving non-teaching positions to a large fraction of our community.
- Hence the fraction of lecturers and university staff in our community is lower than in communities using smaller research infrastructures.
- The balance between research staff and lecturers varies widely from countries to countries.
- Our community also uses more engineering staff and the boundaries between engineers, research engineers and research staff can sometimes be blurred (both in duties and in status).

Beyond tenure: habilitation

- Some countries (France, Germany, Austria, Italy,...) require an additional degree either to reach the rank of professor or to supervise students.
- This degree is called “Habilitation”.
- Here also the examination procedure varies a lot from faculty to faculty.
 - Compilation of papers or a separate manuscript.
 - Oral examination
 - Hearing on the teaching capabilities of the candidate

Chemistry Eurolabels

- In chemistry universities across Europe have created a “Eurolabel” at bachelor and master level.
- A label committee ensures of the quality at a European level of the degrees given under the label.
- Requires close collaboration between the awarding institutions.

Outlook

- The Bologna process has created a common framework across universities.
- However it also supports large autonomy of the universities.
- Master and doctorates are still very different from University to University.
- The Bologna process itself does not ensure uniform quality of the degrees.
- Some fields have created common degrees.
- Digital teaching can also help us to reach a broader student audience and to pool teaching resources in specialised courses.