MOOCs @ EPFL - September 2013
moocs.epfl.ch

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Center for Digital Education
cede.epfl.ch
Why should a (European) university engage in MOOCs?

Immediate answer
• High global visibility
• Better be an actor than a spectator

Obvious opportunity
• We see a lot of potential in improving teaching, e.g., through having more data and high quality courses

Long-term perspective
• Opens opportunities to contribute to and enlarge the mission of the university
• Continuous education, international networking and outreach to developing countries
MOOCs = Massive Open Online Courses

One university professor

10’000 students in a lifetime

Ten EPFL professors

265’000 students in a year
Platforms

Coursera

edX

École Polytechnique Fédérale de Lausanne

EPFL is the Swiss Federal Institute of Technology in Lausanne. The past decade has seen EPFL ascend to the very top of European institutions of science and technology: it is ranked #1 in Europe in the field of engineering by the Times Higher Education (based on publications and citations), Leiden Rankings, and the Academic Ranking of World Universities.

EPFL’s main campus brings together 12,600 students, faculty, researchers, and staff in a high-energy, dynamic learning and research environment. It directs the Human Brain Project, an undertaking to simulate the entire human brain using supercomputers, in order to gain new insights into how it operates and to better diagnose brain disorders. The university is building Solar Impulse, a long-range solar-powered plane that aims to be the first piloted fixed-wing aircraft to circumnavigate the Earth using only solar power. EPFL was part of the Ariane project, developing advanced racing boats that won the America’s Cup multiple times. The university operates, for education and research purposes, a Tokamak nuclear fusion reactor. EPFL also houses the Musée Bolo museum and hosts several music festivals, including Baleiro, that draws over 15,000 guests every year.

EPFL is a major force in entrepreneurship, with 2012 bringing in $100M in funding for ten EPFL startups. Both young spin-offs (like Tyentate and Phe4D) and companies that have long grown past the startup stage (like Logitech) actively transfer the results of EPFL’s scientific innovation to industry.

There are no courses currently available from this school. Check back soon!
Retention rates  [ N=11 courses ]

Video retention

![Video retention chart]

Students who come watch videos

Work retention

![Work retention chart]

Students who do assignments
After the tsunami: the flipped classroom

- MOOCs and face to face
- Videos for knowledge transmission
- Quizzes and Assignments
  - Personalization
  - Autonomy
- Face to face time for interaction
  - With teachers (e.g. deepening concepts)
  - With learners (e.g. watching videos)
MOOCs and group work

(Picasso, Analyse Numérique, N=158)

**With whom do you do the assignments?**

- **Always**
- **Never**

**With whom do you watch the videos?**

- **Always**
- **Never**

Diagram: Analyse Numerique (Prof. M. Picasso)

- **Alone**
- **Pairs**
- **Group**
- **Class**

**EPFL**

**OTHER**
MOOC overview | September 2013

Students’ & Professors’ voice

- **Students**
  - appreciate flexibility
  - like watching the course in groups
  - want the contact with the professors
  - are concerned about data privacy

- **Professors**
  - invest a huge energy
  - take a risk to open their teaching
  - strive for excellence

«In the future, I would prefer to take this course.... »
International Networking

Education delivered across geographic, economic and societal boundaries

Europe
- Eurotech collaboration: continued education for sustainability and life science
- First European MOOCS summit (June 6-7): huge interest

Developing countries
- RESCIF network: interest from African universities
- Africa: sabbatical of president Patrick Aebischer
The **policy** track

- forum for decision-makers in Higher Education: University leaders as well as for in local, regional, national or European authorities. Chair: Mariana Losada, AMUE, France

The **experience** track

- forum for sharing experience among practitioners, i.e. MOOC teachers plus those involved in producing MOOCs. Chair: Carlos Delgado Kloos, Universidad Carlos III de Madrid, Spain

The **research** track

- standard research conference (computer science, learning sciences, instructional psychology, HCI, ...). Chair: Ulrike Cress, KMRC, Tübingen, Germany

The **corporate** track

- set of panels, exhibitions and contacts with and among the providers and consumers of MOOCs in academic and corporate training. Chair: Michel Benard, Google, Switzerland.
MOOCs in Africa
Geographical distribution [ N=7 courses, 164'000 registrations ]

Initiation à la programmation en C++
Geographical distribution [ N=7 courses, 164’000 registrations ]
Students’ profile

- The average age 26 years
- Educated, with 34% bachelor's and 31% having a master's degree.
- > 90% cite “life-long learning,”
- 79% to advance their career
- 51% of students want a certificate
- Want entry-level courses where they can apply the knowledge learned to their every day life.

Data produced by Heather Miller & Martin Odersky

edX Partner News 20, august 2013
Starting fall 2013

**Functional Programming Principles in Scala**
*Martin Odersky*

Learn about functional programming, and how it can be effectively combined with object-oriented programming. Gain practice in writing clean functional code, the Scala programming language.

**Digital Signal Processing**
*Paolo Prandoni and Martin Vetterli*

Learn the fundamentals of digital signal processing theory and discover the ways DSP makes everyday life more productive and fun.

**Neuronal Dynamics - Computational Neuroscience of Single Neurons**
*Wulfram Gerstner*

This course gives an introduction to the field of theoretical and computational neuroscience with a focus on models of single neurons. Neurons encode information about stimuli in a sequence of short electrical pulses (spikes).

**Principles of reactive programming**
*Martin Odersky*

Learn how to write composable software that is event-driven, scalable and resilient and responsive in the presence of failures. Model systems after human organizations or inter-human communication.

**L’art des structures 1**
*Câbles et arcs*

L’art des structures propose une découverte du fonctionnement porteuses, telles que les bâtiments, les toitures ou les ponts. Ce cours donnera une vue de l’ensemble du domaine, et finira de présenter les structures en treillis, en poutres et en cadre.

**Physique générale - mécanique**
*Jean-Philippe Ansermet*

Polytechnique Fédérale de Lausanne, un cours de physique générale, formant la formation de tous les futurs ingénieurs et scientifiques. Le prénom de mécanique en fait partie. Il va pour leur apprendre à transcrire mathématiquement un phénomène physique, afin d’en savoir en fin de compte.

**Initiation à la programmation (en Java)**
*Jamila Sam, Vincent Lepetit et Jean-Cédric Chappelier*

Ce cours initie à la programmation en utilisant le langage Java. Il n’exige pas de connaissance préalable. Les aspects plus avancés (programmation orientée objet) sont donnés dans un cours suivant, « Introduction à la programmation orientée objet (en Java) ».

**Initiation à la programmation (en C++)**
*Vincent Lepetit, Jean-Cédric Chappelier et Jamila Sam*

Ce cours initie à la programmation en utilisant le langage C++. Il n’exige pas de connaissance préalable. Les aspects plus avancés (programmation orientée objet) sont donnés dans un cours suivant, « Introduction à la programmation orientée objet (en C++) ».
## EPFL MOOCs [ 25 courses total ]

<table>
<thead>
<tr>
<th>Type</th>
<th>MOOCs</th>
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### Type Distribution
- **Africa**: 9 courses
- **Internal**: 3 courses
- **USP**: 13 courses

### MOOC Overview

<table>
<thead>
<tr>
<th>Type</th>
<th>Fall 2012</th>
<th>Spring 2013</th>
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The MOOC Factory

- Producing MOOCs
- Flipped classroom
- Operating platforms
- Data Analytics
- Operating Moodle
- Tools & Services

EPFL Center for Digital Education
Video production

- 1 unit = 7-15 minutes
  - 1 unit => 1 hour studio
  - 1 unit => 4 hours editing
- 1 MOOC week = 5 units
  - 1 week = 5 hours studio
  - 1 week = 20 hours editing
- 1 MOOC = 7 weeks
  - 1 MOOC = 35 hours studio
  - 1 MOOC = 4 weeks editing

10 MOOCs to produce in 3 months
10 man/months editing =>
300% editor FTE for three month
2 studios = 1 central + 1 IC faculty
Production Scheduling Challenges

- Different working styles
  - Last-minute MOOCs (2 month)
  - Long term planners (6 month)

- Several deadlines
  - September (start of term)
  - October (mid-term)

- Capacity
  - Max 8 MOOCs per week in 1 studio
  - 1 MOOC = 10 sessions
  - 100 sessions in three month
The MOOC

Application
- Coordination and partnerships
- 3-6 month
- Next call: fall 2013

Editorial Committee
- Evaluation

Course Design
- How to flip your class?
- What assignments?
- 3 month

Course Production
- Record videos
- Prepare assignments
- 3-4 month

Course
- Manage forums, assignments
- and face-to-face
- 7-14 weeks

Review
Media Training
Course Design Agreement
<table>
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<tr>
<th>Time</th>
<th>Milestone</th>
<th>Duration (est.)</th>
<th>Work to be completed</th>
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<td>1 D-8 month</td>
<td>Application</td>
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<tr>
<td>1 D-6 month</td>
<td>Editorial Committee</td>
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| 2 D-5 month | Course Design                   | 1-2 weeks       | - Define the structure of one week of instruction
- Cut the course into 7/14 weeks, each week consists of 5-6 small units of 7-12 minutes which each cover 1 concept.
- Identify Existing Material to be integrated and
- Define assignments (MCQ, peer assessment, programming assignments) |
| 2 D-5 month | Media Training                   | 2 hours         | - Slide Design (what happens on the screen)
- [MOOC Media Template](#) |
| 3 D-4 month | Prototype Week                   | 1 week (Prof)   | - Design slides according to the Video Lecture Scenario
- Record and edit the video
- Hire video assistant |
| 3 D-4 month | Review Meeting                   | 2 days (CEDE)   | - Reflect on quality of video / feedback
- Define rules for video editors |
| 4 D-3 month | Teaser                           | 2 days (Prof)   | - Prepare scenario (text + illustrations)
- Record in studio and edit |
| 4 D-3 month | Landing page                     | 2 days          | - Describe course on platform (text + teaser)
- Create professor(s) pages |
| 4 D-2 month | Course Description Agreement     |                 | - For coursera courses, defines the content, copyright and period of delivery |
| 5 D-3 month | Productions weeks 2-7            | 3 month         | - Studio work, video editing
- 1 hour video = 2-4 hours studio = 20-40 hours editing |
| 6 D-Day  | Course Opening                   |                 |                                                                                     |
| 6       | Delivery                         | 7-14 weeks      | - post weekly announcement
- monitor forum & supervise assignments |
(Potential) Effects of MOOCs

Resources at universities
- Less need for big classrooms, more need for small classrooms
- Less ex-cathedra teaching, more face-to-face contact
- Less resources needed?

Academic system: MOOCs …
- redefine boundary between academia and professional life
- favor mobility (ECTS, opportunity for Europe)
- more specialization in academia (teacher, researcher, …)
- require fair use of student data and data protection

Social Impact
- MOOCs will make knowledge accessible to disfavored people
- Risk of two class education (MOOCs vs on campus)
- Competition in knowledge work market will become global
Better be an actor than a spectator