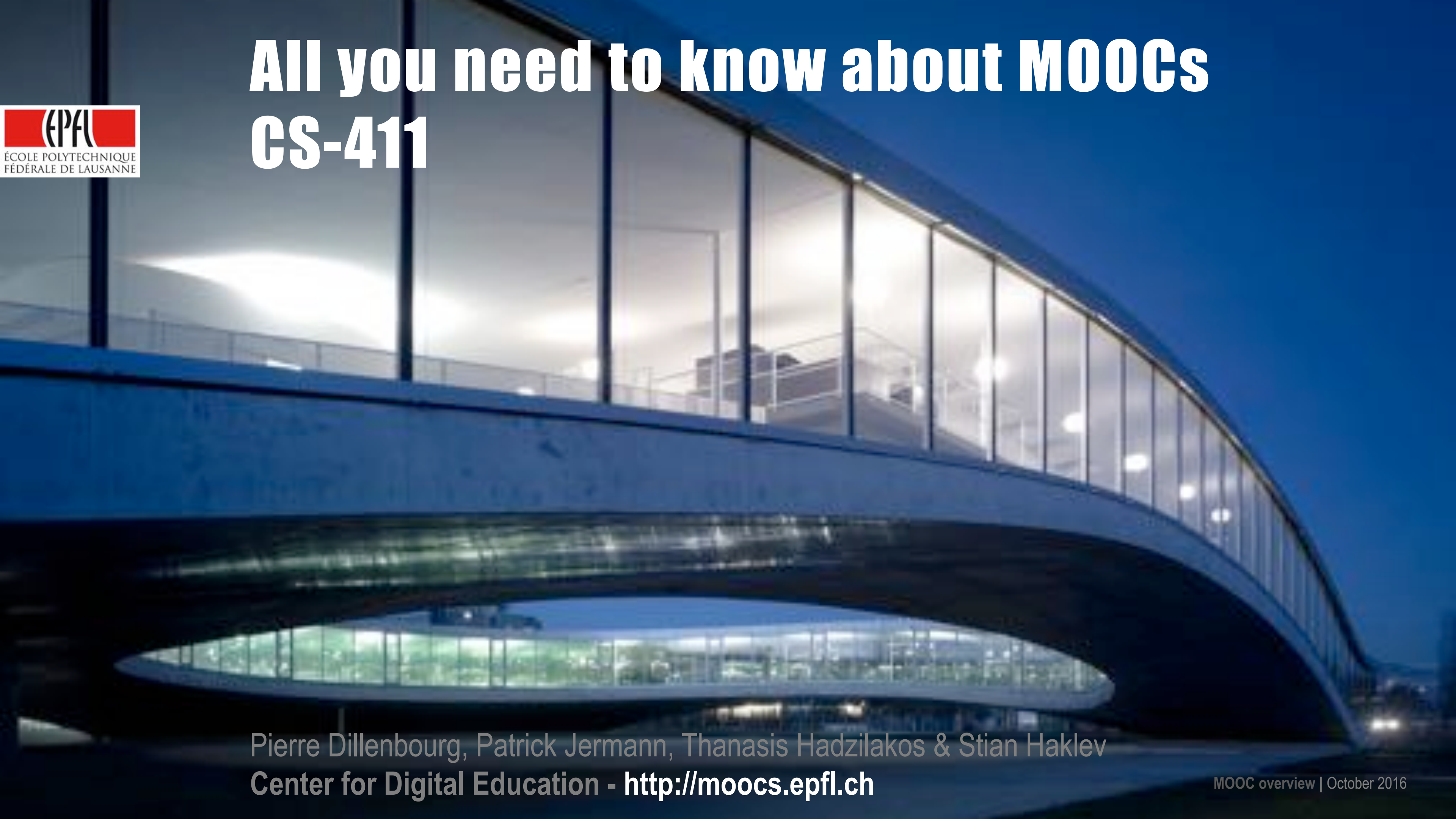


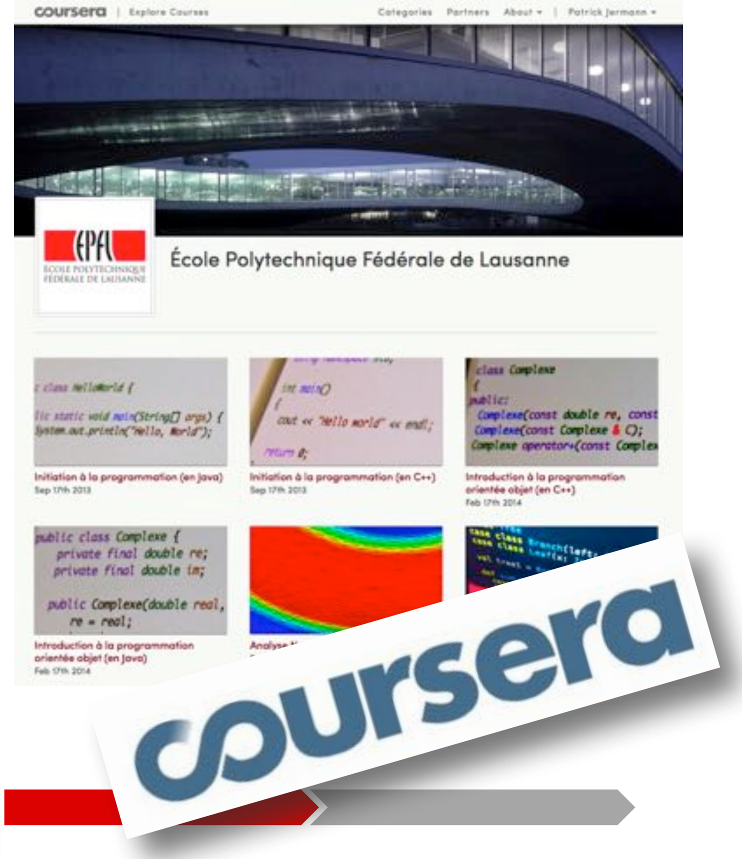
All you need to know about MOOCs CS-411

Pierre Dillenbourg, Patrick Jermann, Thanasis Hadzilakos & Stian Haklev

Center for Digital Education - http://moocs.epfl.ch

www.coursera.org

www.edx.org



École Polytechnique Fédérale de Lausanne

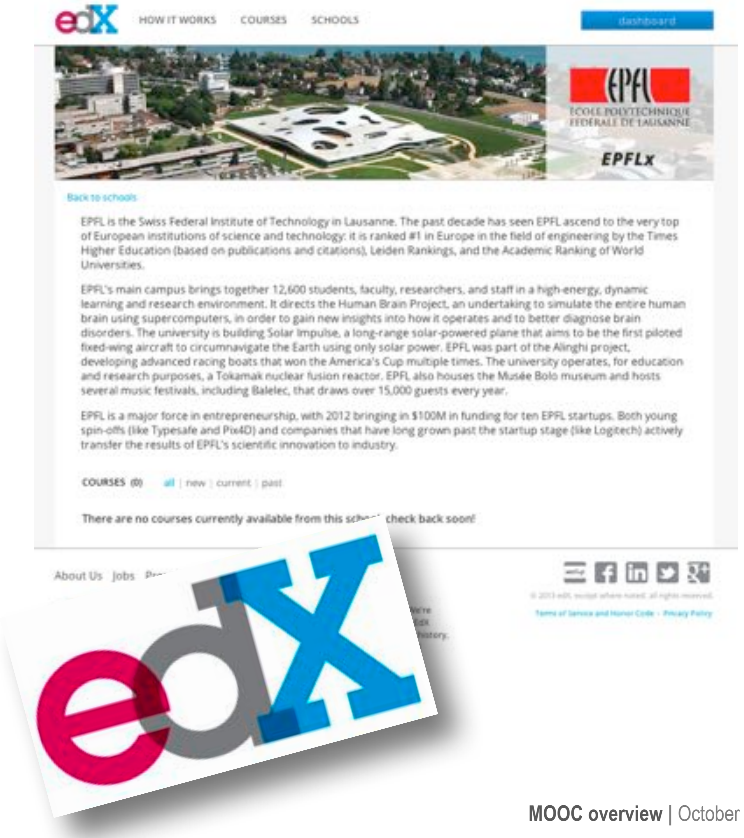
Initiation à la programmation (en java)
Sep 17th 2013

Initiation à la programmation (en C++)
Sep 17th 2013

Introduction à la programmation orientée objet (en C++)
Feb 17th 2014

Introduction à la programmation orientée objet (en Java)
Feb 17th 2014

Analyse



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 Alinghi 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 Balelec, 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 Typesafe and Pix4D) and companies that have long grown past the startup stage (like Logitech) actively transfer the results of EPFL's scientific innovation to industry.

COURSES (0) all | new | current | past

There are no courses currently available from this sch check back soon!

Catalogue

http://moocs.epfl.ch

Upcoming **Electronique I**
Maher Kayal, Cédric Meinen
Starts in: 70 Days
Introduction à l'électronique analogique- première partie. Fonctions de base réalisées à l'aide des amplificateurs opérationnels. Learn more
Bachelor Level MOOC
Sign Up

Upcoming **Exploring Humans' Space: An Introduction to Geographicity**
Jacques Levy, Boris Beaude, Hélène Noizet, Patrick Poncet
Starts in: 93 Days
Explore how geography, cartography, urbanization and spatial justice play a role in shaping the notion of human space. Learn more
Master Level MOOC
Sign Up

Upcoming **Explorer l'espace des humains: une introduction à la géographicité**
Jacques Levy, Boris Beaude, Hélène Noizet, Patrick Poncet
Starts in: 93 Days
Explorer comment la géographie, la cartographie, l'urbanisation et la justice spatiale jouent un rôle dans la compréhension de l'espace des humains et des sociétés. Learn more
Master Level MOOC
Sign Up

Upcoming **Smart Cities – Management of Smart Urban Infrastructures**
Matthias [illegible]
Starts in: 242 Days
[illegible]
Master Level MOOC
Sign Up

Running **Mécanique de Newton**
Jean-Philippe Ansermet
Ce cours de Physique générale – mécanique fourni les outils permettant de maitriser la mécanique newtonienne du point matériel. Learn more

Running **Mécanique du Point Matériel**
Jean-Philippe Ansermet
Ce cours de Physique générale – mécanique fourni les outils permettant de maitriser la mécanique newtonienne du point matériel. Learn more
Propedeutic Level MOOC
Sign Up

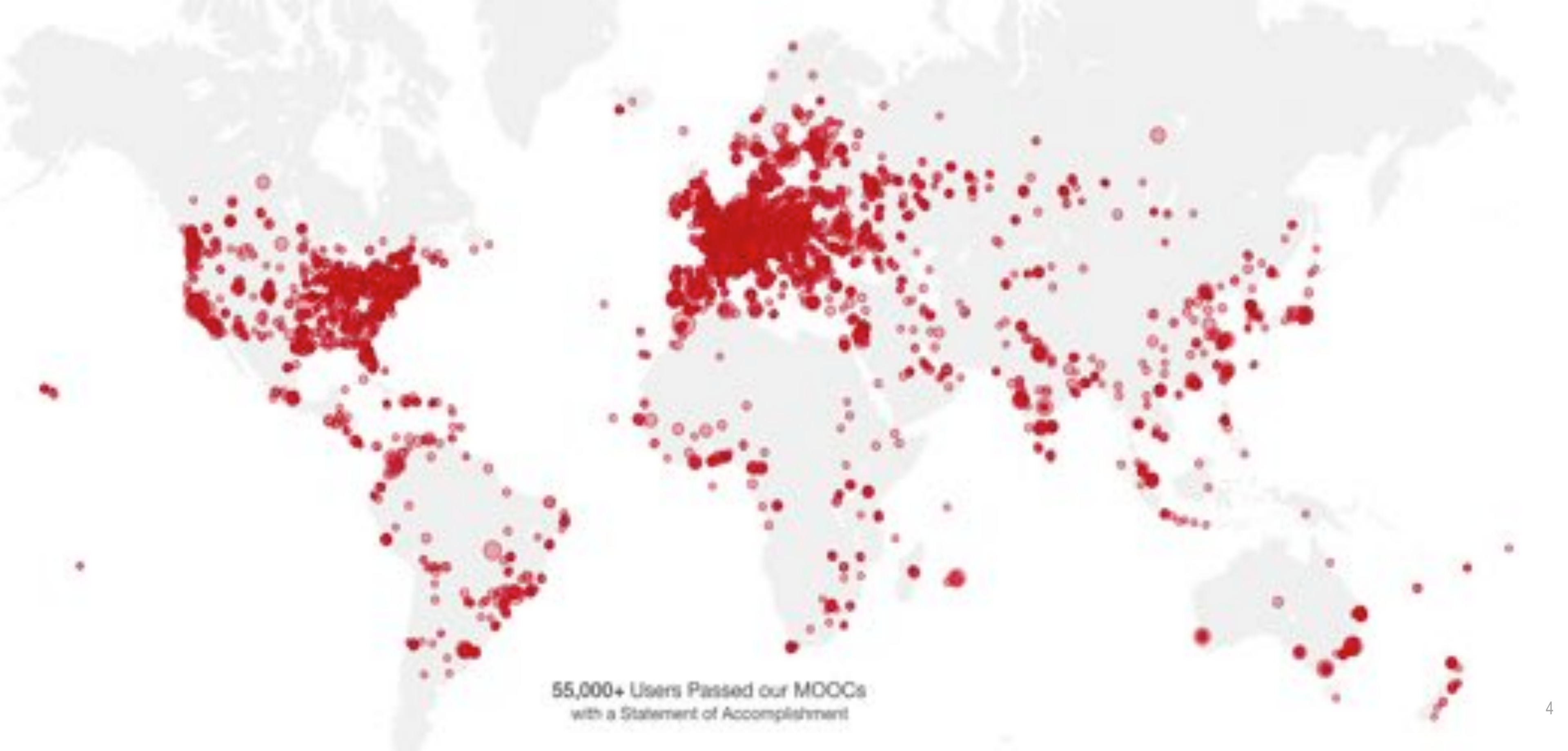
Running **Villes Africaines: Quartiers précaires**
Jérôme Chenal, Isagha Diagana
L'objet de ce cours est l'étude de la restructuration des quartiers précaires des villes africaines. Il s'agit, en partant de la compeéhension de leur formation, de leur organisation et de leur fonctionnement, d'examiner les modes d'intervention qui visent leur revalorisation et intégration dans les structures formelles des villes qui les accueillent. Learn more
Hors Programme Level MOOC
Sign Up

Running **Fonctions Trigonométriques, Logarithmiques et Exponentielles**
Hans-Jorg Ruppen
Ce cours donne les connaissances fondamentales liées aux fonctions trigonométriques, logarithmiques et exponentielles. La présentation des concepts et des propositions est soutenue par une grande gamme de figures et d'animations, ainsi que par des exemples qui illustrent la mise en oeuvre des connaissances acquises. Learn more
Preparatory Level MOOC
Sign Up

Running **Villes africaines: Environnement urbain**
Jérôme Chenal, N'Diékhor Yemadji
Le cours propose une lecture de l'environnement urbain en Afrique à travers les thématiques les plus pertinentes pour mesurer le niveau de développement d'un pays : [illegible]
Hors Programme Level MOOC
Sign Up

Running **Mécanique du Solide Indéformable**
Jean-Philippe Ansermet, Paul-Salomon Ngohe-Ekam
Ce cours de Physique générale – mécanique fourni les outils permettant de maitriser la

58’000+ users got a statement of accomplishment



55,000+ Users Passed our MOOCs
with a Statement of Accomplishment

M

Massive: Over a 3 years period, we attracted 1’440’000 students. Our most popular MOOC got > 500’000 participants. Many have 2-3K. How do you **scale-up** instruction ?

O

Open: Open as in **free**. What about internet access in developing countries. And the need to become profitable ? Open as *without* **prerequisites**. Anyone can sign-up. Booming continued-ed market.

O

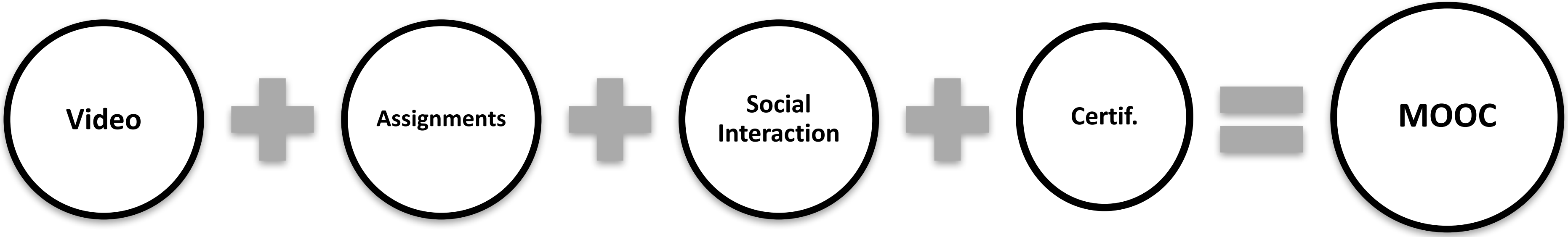
Online: Distance education. *Blended* learning. What is the difference with a Moodle site ? How do MOOCs change **on-campus** education ? Flipped classrooms.

C

Course: A course is more than a wiki, more than a youtube playlist. Sequencing, pedagogical contract, learning activities, exercises.

MOOC Anatomy

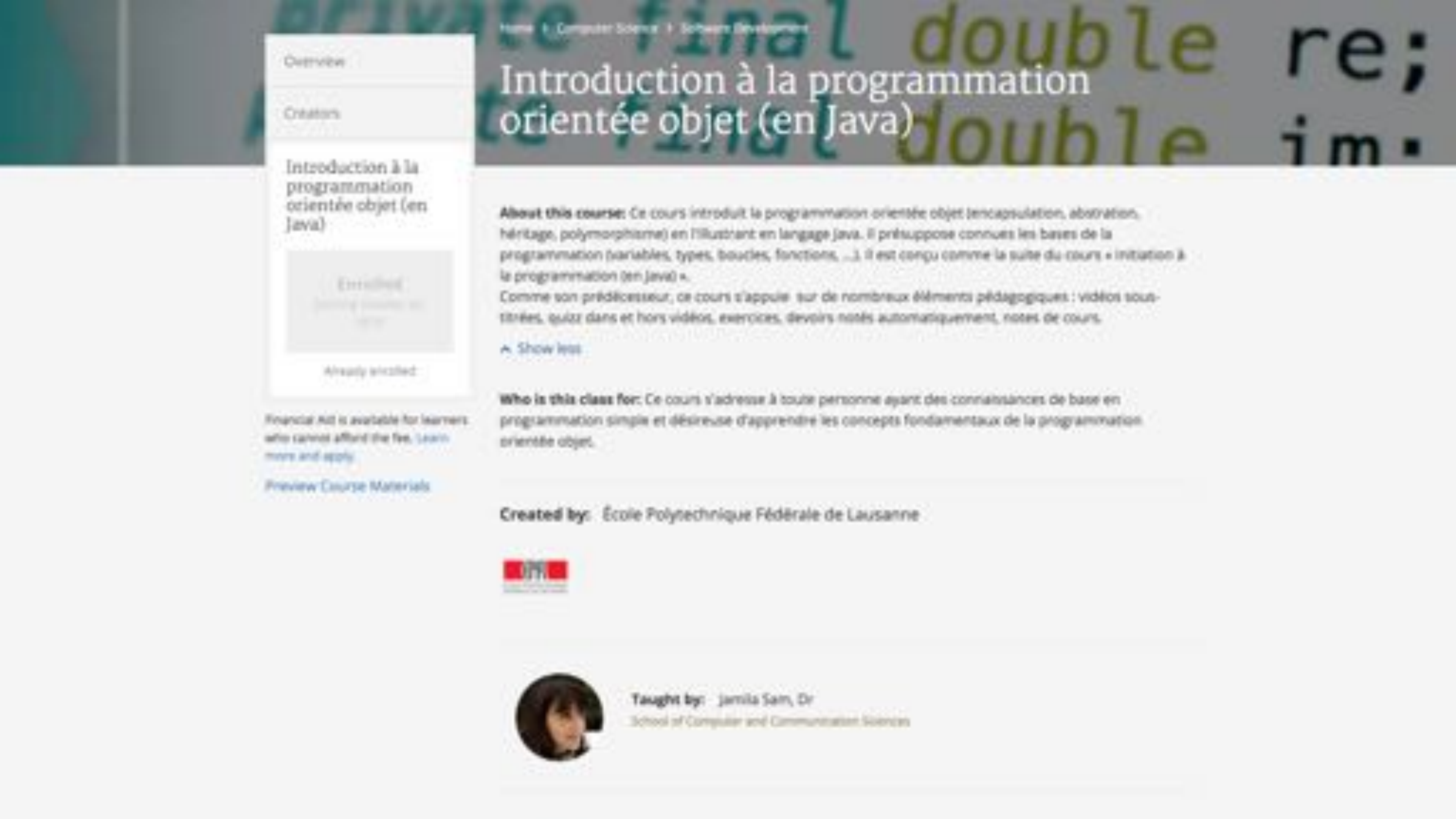
MOOC Components



Video + Assignments + Social Interaction + Certif. = MOOC

Best Teaching Award – 2015 [Jamila Sam & Jean-Cédric Chappelier]

- JAVA and C++ MOOC
- Automatic Graders
- Flipped Classroom
  - Detailed instructions
  - Mandatory Videos
  - In-class complements



Introduction à la programmation orientée objet (en Java)

Introduction à la programmation orientée objet (en Java)

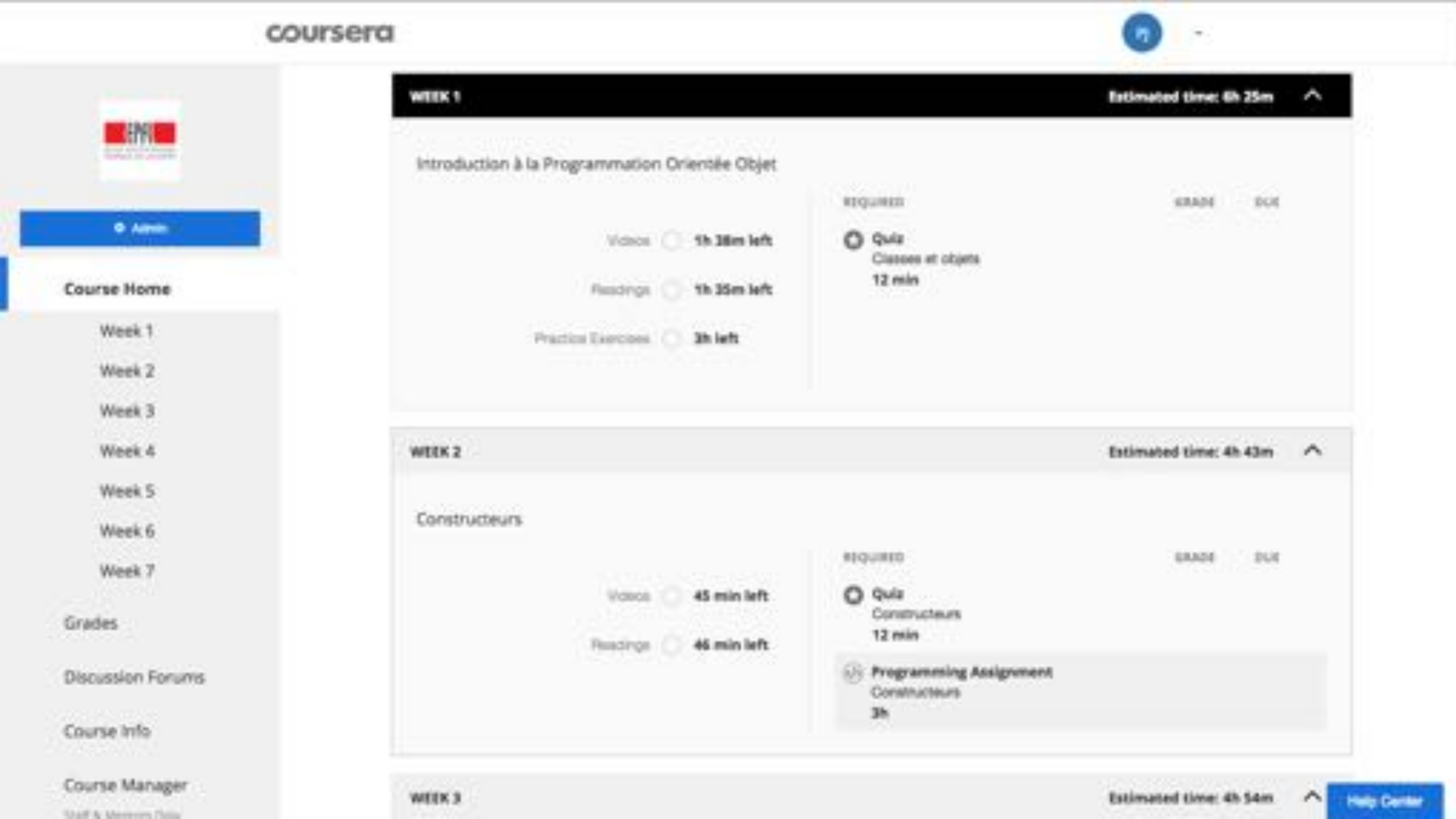
Financial Aid is available for learners who cannot afford the fee. Learn more and apply.

About this course: Ce cours introduit la programmation orientée objet (encapsulation, abstration, héritage, polymorphisme) en l'illustrant en langage Java. Il présuppose connues les bases de la programmation (variables, types, boucles, fonctions, ...). Il est conçu comme la suite du cours « Initiation à la programmation (en Java) ».
Comme son prédécesseur, ce cours s'appuie sur de nombreux éléments pédagogiques : vidéos sous-titrées, quizz dans et hors vidéos, exercices, devoirs notés automatiquement, notes de cours.

Who is this class for: Ce cours s'adresse à toute personne ayant des connaissances de base en programmation simple et désireuse d'apprendre les concepts fondamentaux de la programmation orientée objet.

Created by: École Polytechnique Fédérale de Lausanne

Taught by: Jamila Sam, Dr
School of Computer and Communication Sciences



coursera

Admin

Course Home

Week 1

Week 2

Week 3

Week 4

Week 5

Week 6

Week 7

Grades

Discussion Forums

Course Info

Course Manager

Staff & Mentors Only

WEEK 1 Estimated time: 6h 25m

Introduction à la Programmation Orientée Objet

Videos ○ 1h 38m left

Readings ○ 1h 35m left

Practice Exercises ○ 3h left

REQUIRED	GRADE	DUE
Quiz Classes et objets 12 min		

WEEK 2 Estimated time: 4h 43m

Constructeurs

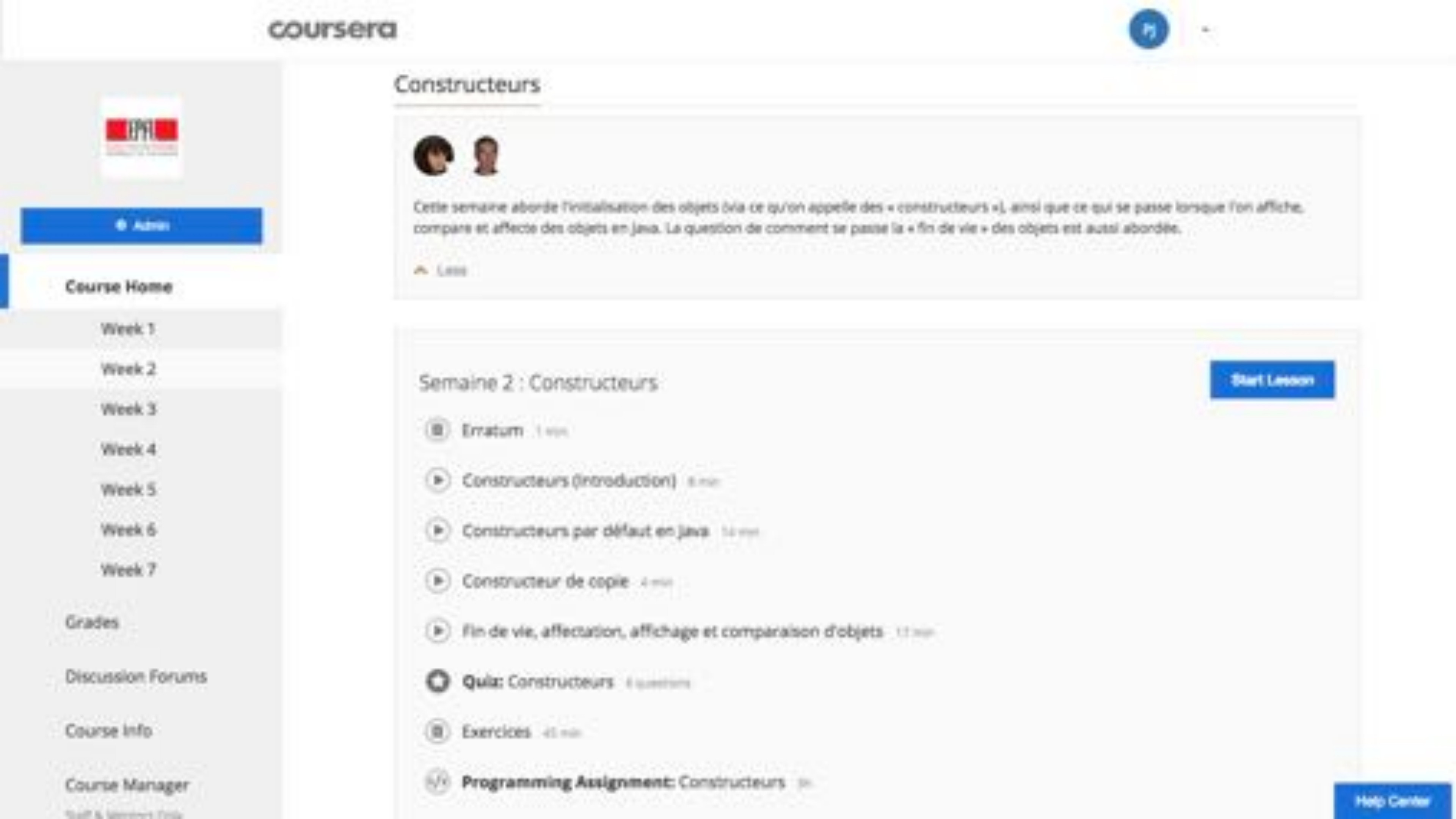
Videos ○ 45 min left

Readings ○ 46 min left

REQUIRED	GRADE	DUE
Quiz Constructeurs 12 min		
Programming Assignment Constructeurs 3h		

WEEK 3 Estimated time: 4h 54m

Help Center



Constructeurs

Cette semaine aborde l'initialisation des objets (via ce qu'on appelle des « constructeurs »), ainsi que ce qui se passe lorsque l'on affiche, compare et affecte des objets en Java. La question de comment se passe la « fin de vie » des objets est aussi abordée.

Semaine 2 : Constructeurs

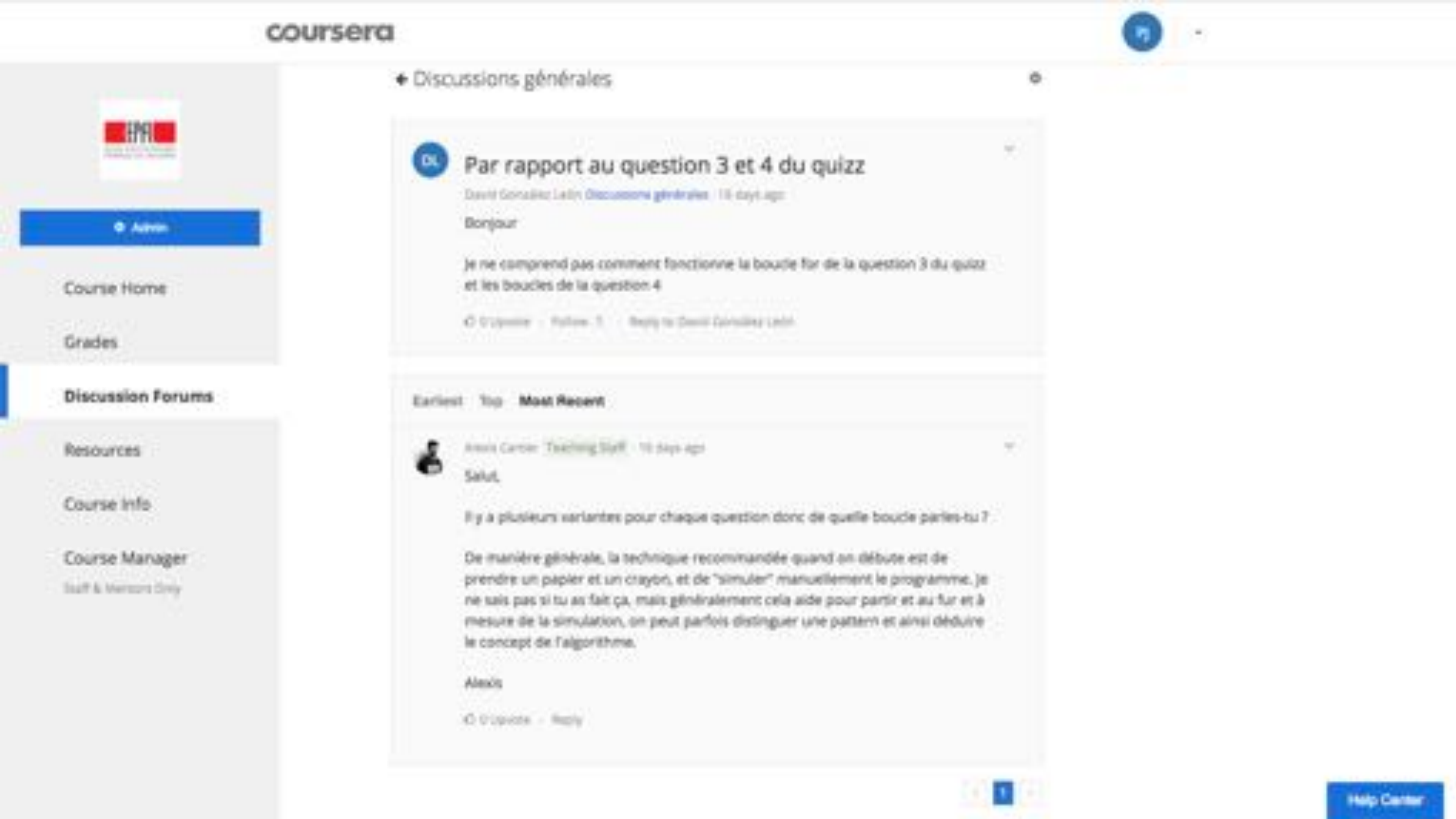
- Erratum 1 min
- Constructeurs (introduction) 8 min
- Constructeurs par défaut en Java 14 min
- Constructeur de copie 4 min
- Fin de vie, affectation, affichage et comparaison d'objets 13 min
- **Quiz:** Constructeurs 4 questions
- Exercices 45 min
- **Programming Assignment:** Constructeurs 3h

Appel aux autres constructeurs

Examinons pour finir certaines
facilités offertes par le langage

Constructeurs par défaut en java

Have a question? Discuss this lecture in the week forums.



◆ Discussions générales

Par rapport au question 3 et 4 du quizz

David González León Discussions générales · 16 days ago

Bonjour

Je ne comprend pas comment fonctionne la boucle for de la question 3 du quizz et les boucles de la question 4

0 Upvote · Follow · 1 · Reply to David González León

Earliest Top **Most Recent**

Alexis Cartier Teaching Staff · 16 days ago

Salut,

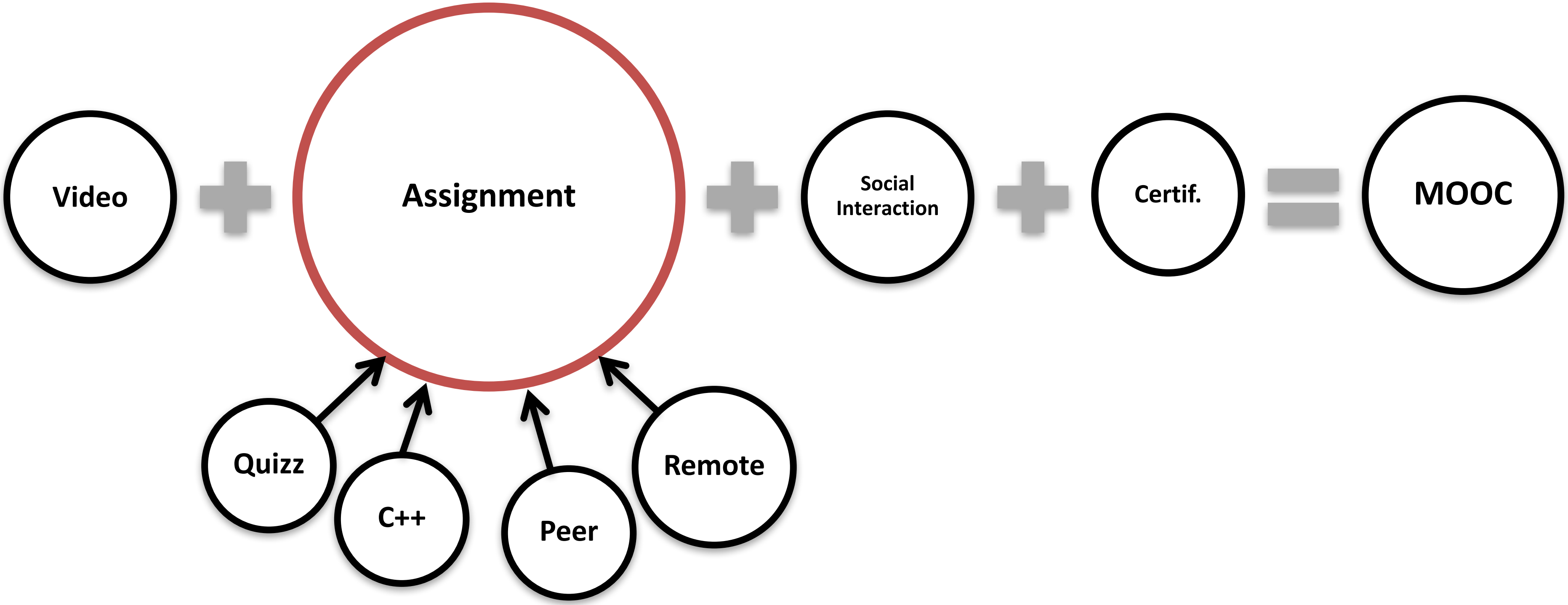
Il y a plusieurs variantes pour chaque question donc de quelle boucle parles-tu ?

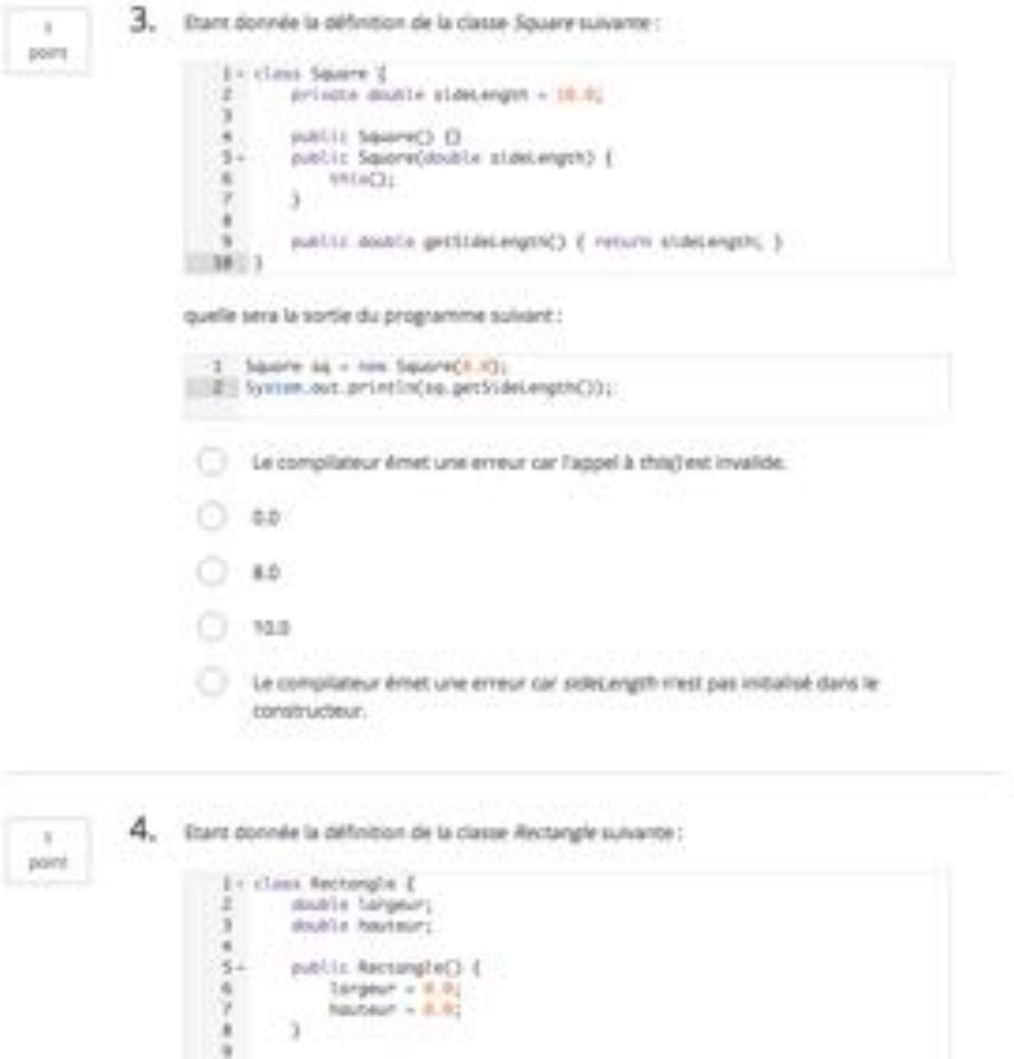
De manière générale, la technique recommandée quand on débute est de prendre un papier et un crayon, et de "simuler" manuellement le programme. Je ne sais pas si tu as fait ça, mais généralement cela aide pour partir et au fur et à mesure de la simulation, on peut parfois distinguer une pattern et ainsi déduire le concept de l'algorithme.

Alexis

0 Upvote · Reply

Evaluation & Certification





1 point

3. Etant donnée la définition de la classe *Square* suivante :

```java
class Square {
    private double sideLength = 10.0;

    public Square() {}
    public Square(double sideLength) {
        this();
    }

    public double getSideLength() { return sideLength; }
}
```

quelle sera la sortie du programme suivant :

```java
Square sq = new Square(8.0);
System.out.println(sq.getSideLength());
```

○ Le compilateur émet une erreur car l'appel à this() est invalide.

○ 0.0

○ 8.0

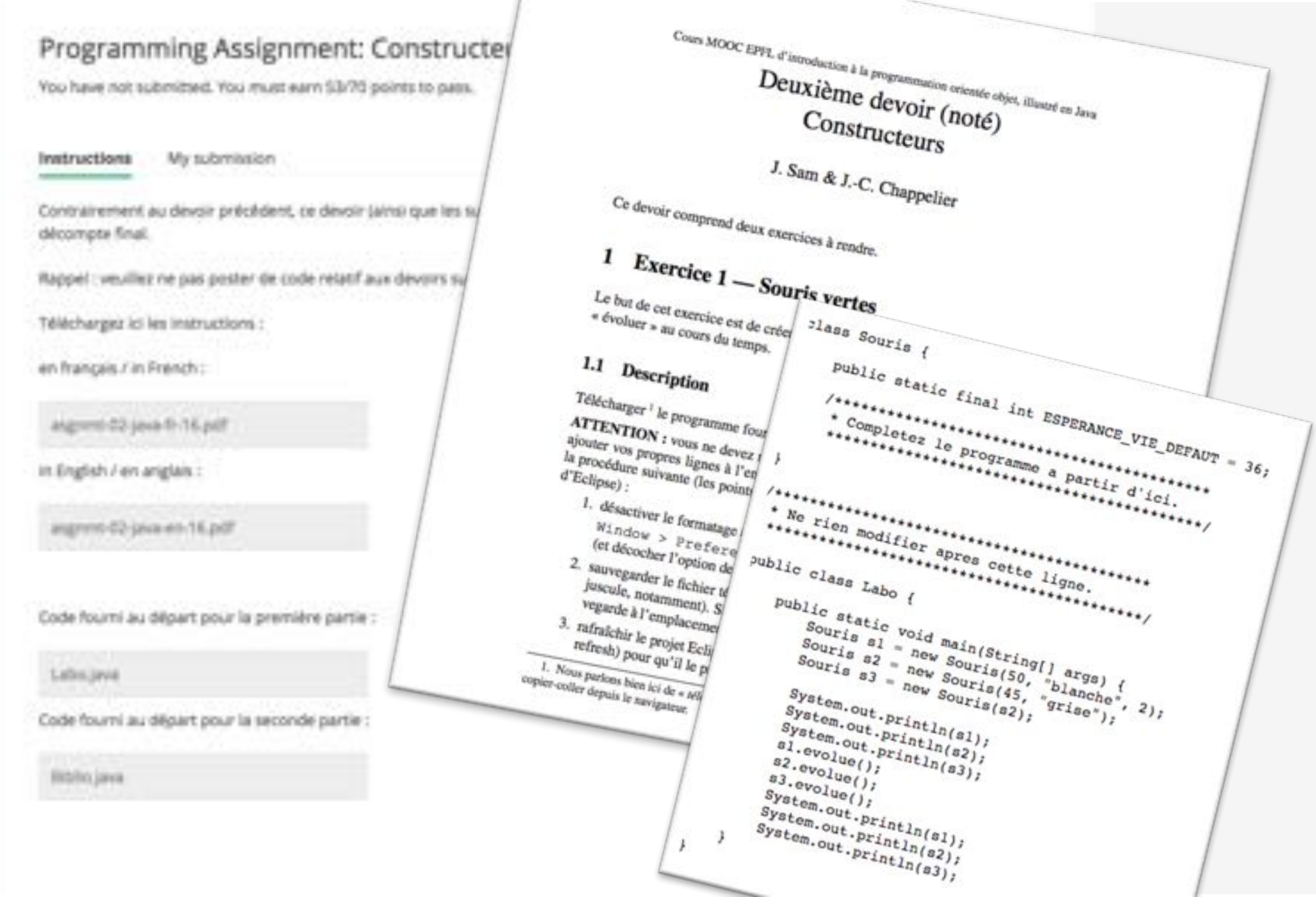
○ 10.0

○ Le compilateur émet une erreur car sideLength n'est pas initialisé dans le constructeur.

1 point

4. Etant donnée la définition de la classe *Rectangle* suivante :

```java
class Rectangle {
    double largeur;
    double hauteur;

    public Rectangle() {
        largeur = 0.0;
        hauteur = 0.0;
    }

```



Programming Assignment: Constructe

You have not submitted. You must earn 53/70 points to pass.

Instructions My submission

Contrairement au devoir précédent, ce devoir (ainsi que les su
décompte final.

Rappel : veuillez ne pas poster de code relatif aux devoirs su

Téléchargez ici les instructions :

en français / in French :

asgnmt-02-java-fr-16.pdf

in English / en anglais :

asgnmt-02-java-en-16.pdf

Code fourni au départ pour la première partie :

Labo.java

Code fourni au départ pour la seconde partie :

Biblio.java

Cours MOOC EPFL d'introduction à la programmation orientée objet, illustré en Java

Deuxième devoir (noté)
Constructeurs

J. Sam & J.-C. Chappelier

Ce devoir comprend deux exercices à rendre.

1 Exercice 1 — Souris vertes

Le but de cet exercice est de crée
« évoluer » au cours du temps.

1.1 Description

Télécharger[1] le programme four

ATTENTION : vous ne devez
ajouter vos propres lignes à l'en
la procédure suivante (les point
d'Eclipse) :

1. désactiver le formatage
   `Window > Prefere`
   (et décocher l'option de
2. sauvegarder le fichier t
   juscule, notamment). S
   vegarde à l'emplaceme
3. rafraîchir le projet Ecli
   refresh) pour qu'il le p

[1] Nous parlons bien ici de « télé
copier-coller depuis le navigateur.

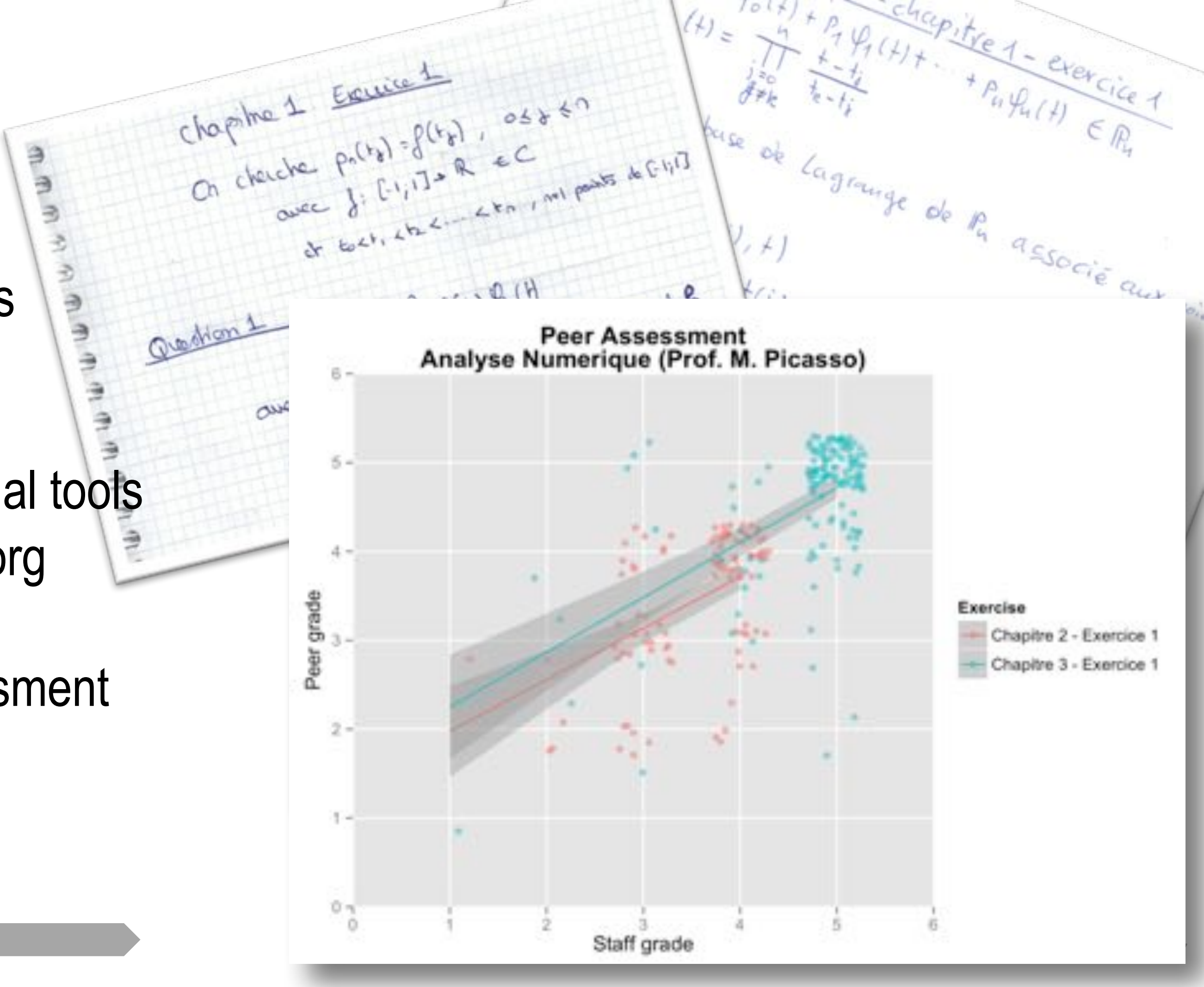
```
class Souris {

    public static final int ESPERANCE_VIE_DEFAUT = 36;

    /*****************************************
     * Completez le programme a partir d'ici.
     *****************************************/
}

/*******************************************
 * Ne rien modifier apres cette ligne.
 *******************************************/

public class Labo {

    public static void main(String[] args) {
        Souris s1 = new Souris(50, "blanche", 2);
        Souris s2 = new Souris(45, "grise");
        Souris s3 = new Souris(s2);

        System.out.println(s1);
        System.out.println(s2);
        System.out.println(s3);
        s1.evolue();
        s2.evolue();
        s3.evolue();
        System.out.println(s1);
        System.out.println(s2);
        System.out.println(s3);
    }
}
```

Peer Asessment

- Address complex skills
- Assessing = Learning

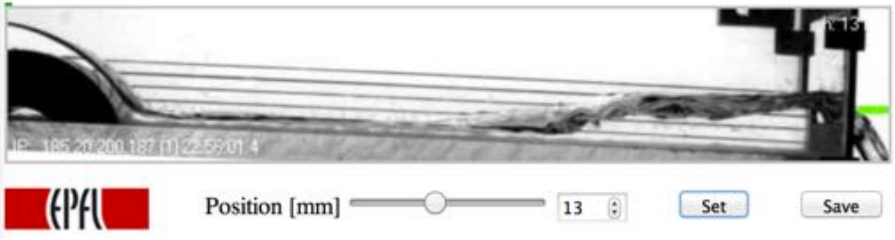
- Possible to use external tools e.g. www.bibsonomy.org

- Too much peer assessment kills peer assessment

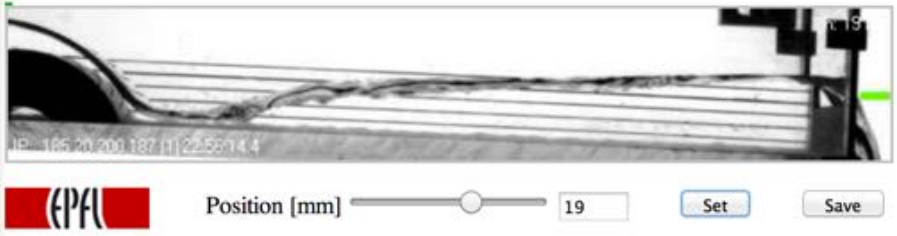


Mécanique des Fluides

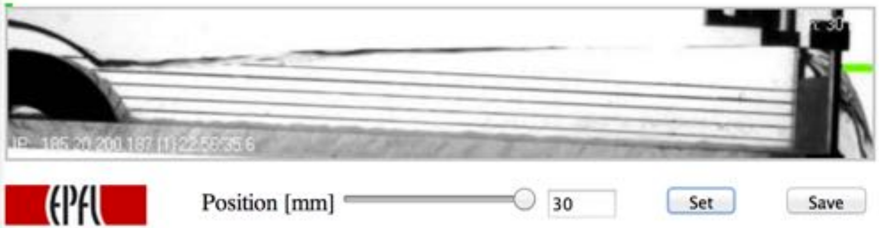
[F. Gallaire, C. Ancey, M. Ramaioli]



Position [mm] 13



Position [mm] 19



Position [mm] 30

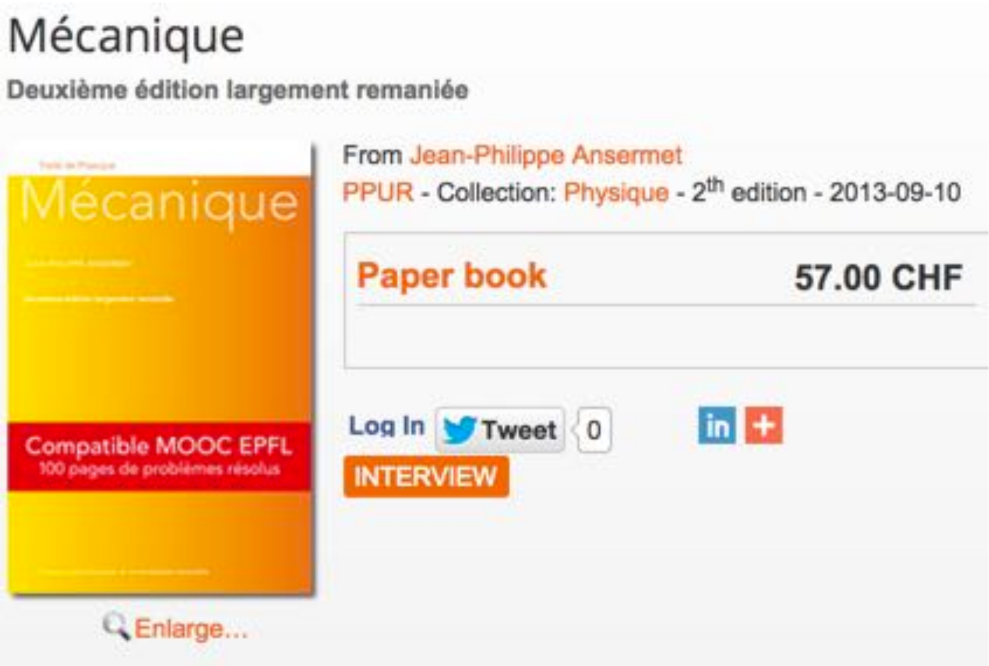
- Upon connection, a pump starts (http://lhe.epfl.ch/piwigo/index.php?/category/32)
- Students determine the height of a dam by moving a cursor
- The system reconfigures and transmits the changes via a real-time video stream
- The student saves the result for analysis

Assignments and knowledge control

- Every week
  - 1 Assignment = Homework = Grades
  - N Exercises = Learning = No grades
- Exams
  - Mid-term (in week 4-5)
  - Final exam (in week 8)
- Grading policy
  - Determine early on what weight is given to Assignments and Exams in the final grade, e.g. 1/3 for assignements + 1/3 mid-term + 1/3 final

- Multiple Choice Questions
  - attend seminar about designing MCQ
- Programming Assignments
  - automatic correction needs to be developed by the prof's team
  - Coordinate with the platform engineers early on
- Peer-Assessments
  - Rubric design is requires careful design
  - Settings are tricky (malus for not participating, how many corrections are required by student ?)

MOOCs and BOOCs



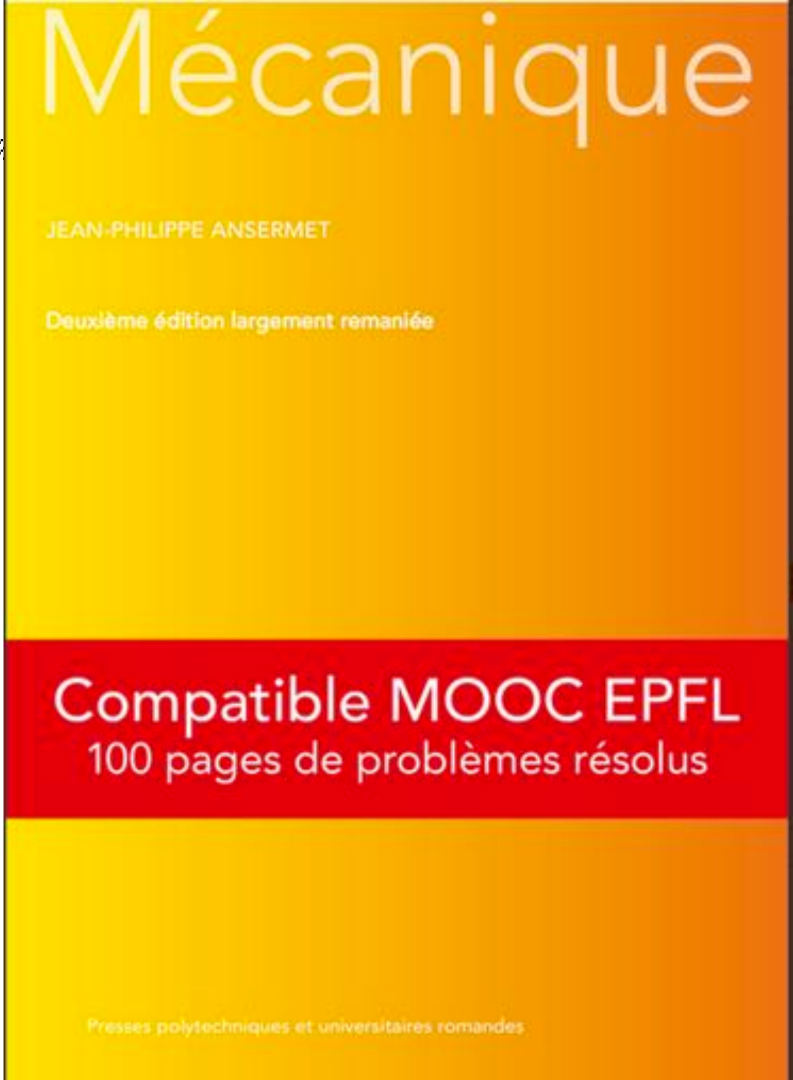
Mécanique

Deuxième édition largement remaniée

From Jean-Philippe Ansermet

PPUR - Collection: Physique - 2th edition - 2013-09-10

Paper book **57.00 CHF**



Mécanique

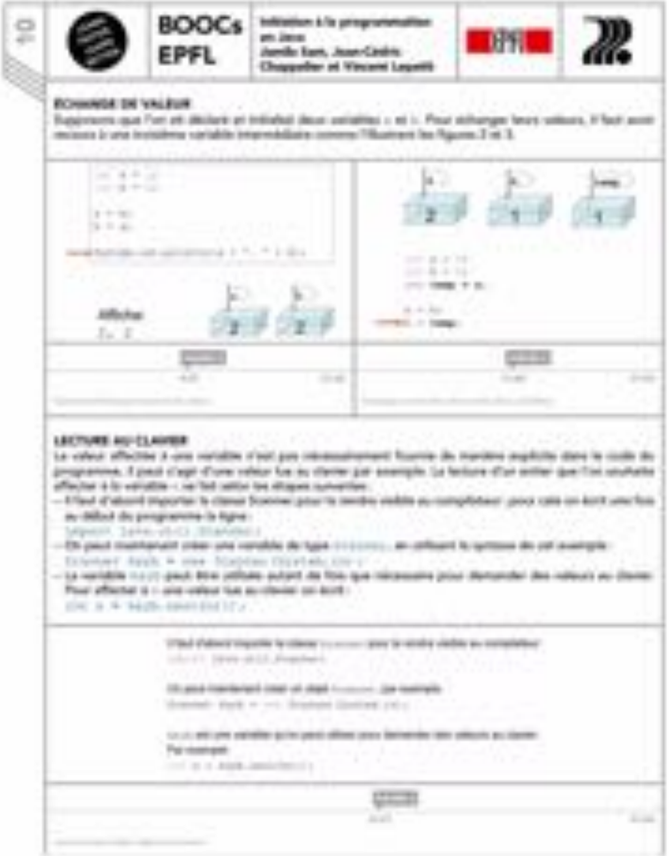
JEAN-PHILIPPE ANSERMET

Deuxième édition largement remaniée

Compatible MOOC EPFL

100 pages de problèmes résolus

Presses polytechniques et universitaires romandes



BOOCs EPFL

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

ECHANGE DE VALEUR

[illegible]

LECTURE AU CLAVIER

[illegible]

BOOCs EPFL

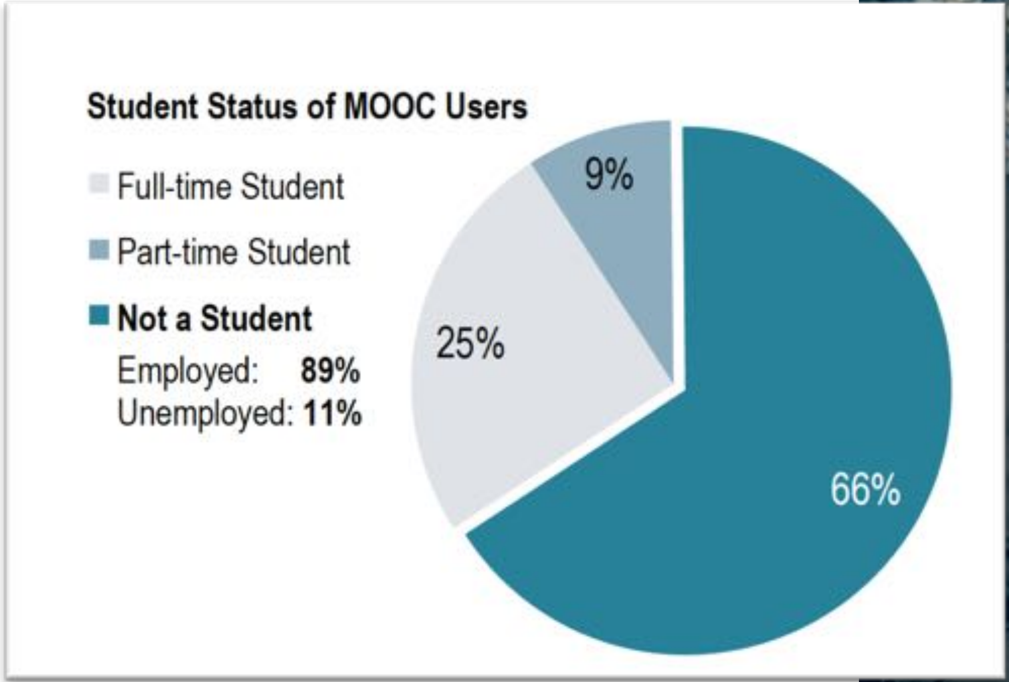
Initiation à la programmation en Java
Jamila Sam, Jean-Cédric Chappelier et Vincent Lepetit

[illegible]

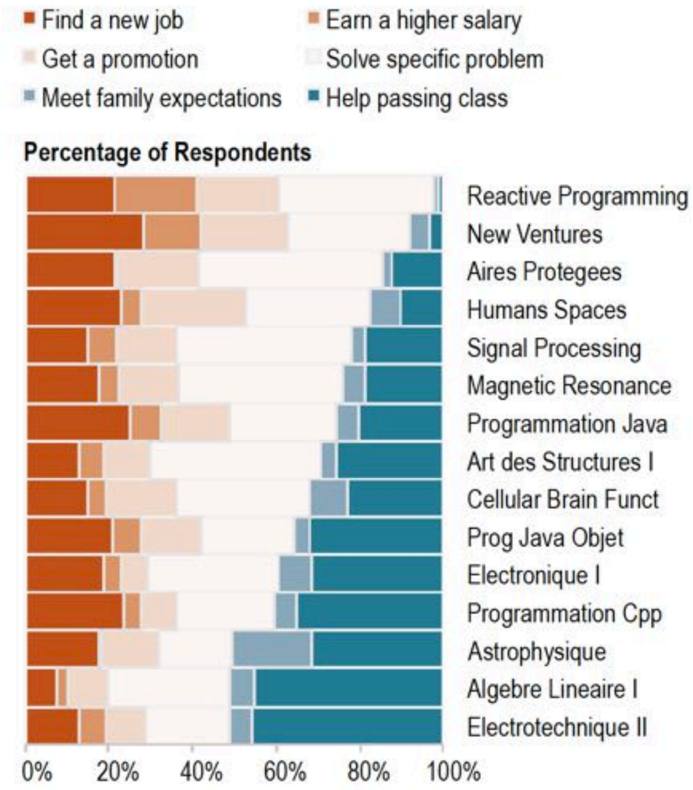
https://issuu.com/ppur-epflpress/docs/booc-java?e=18780271/38950647

Participants

Olga Reznikova - Russia

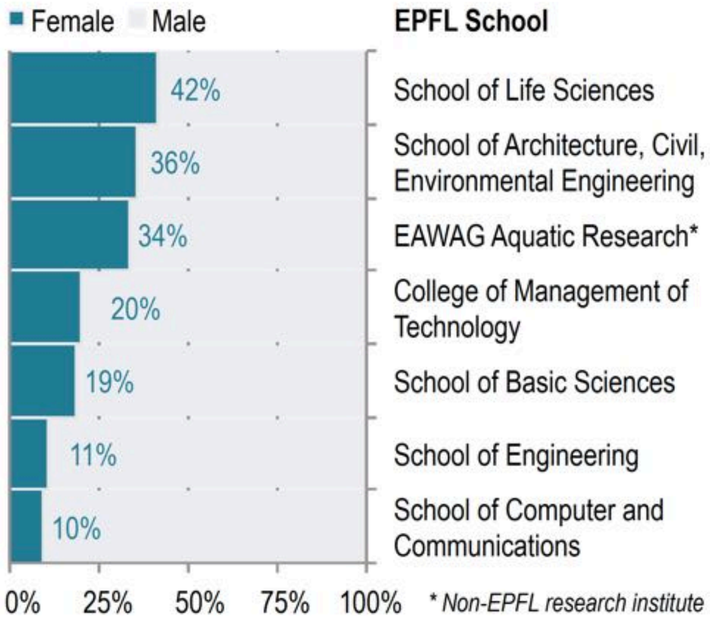


Why do participants register ?

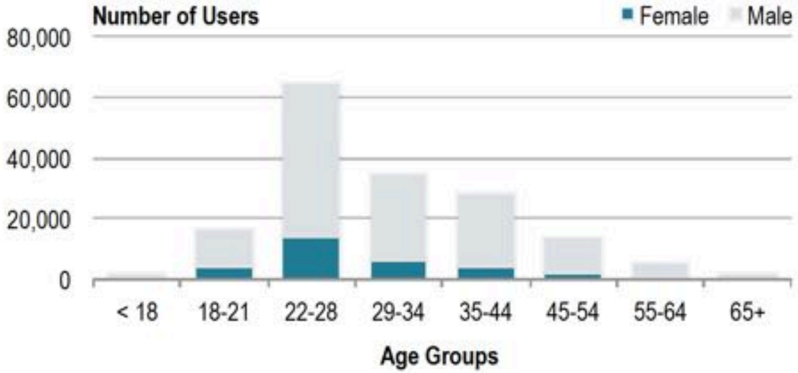


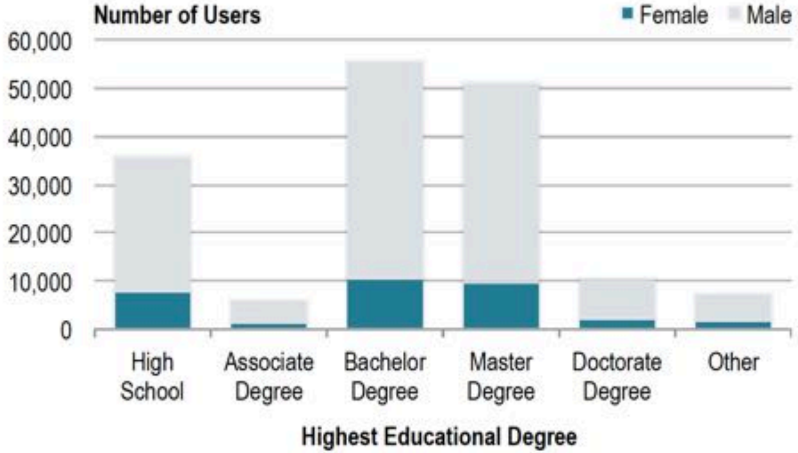
- Professional
  - Advanced Programming
  - Business skills
- Academic
  - Basic Programming
  - Basic STEM courses

Demographics – Age & Gender

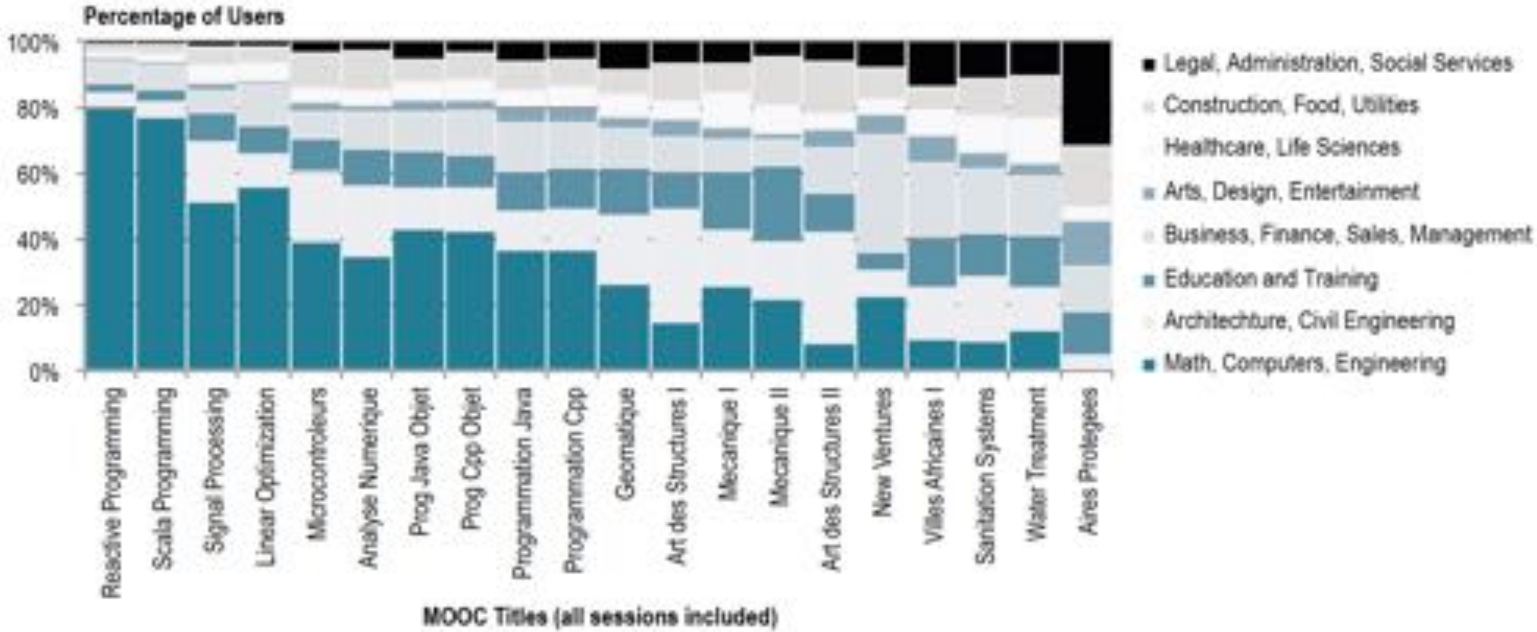


* Non-EPFL research institute





Demographics - Participants’ Background



On Line
On Campus

Engagement and grades

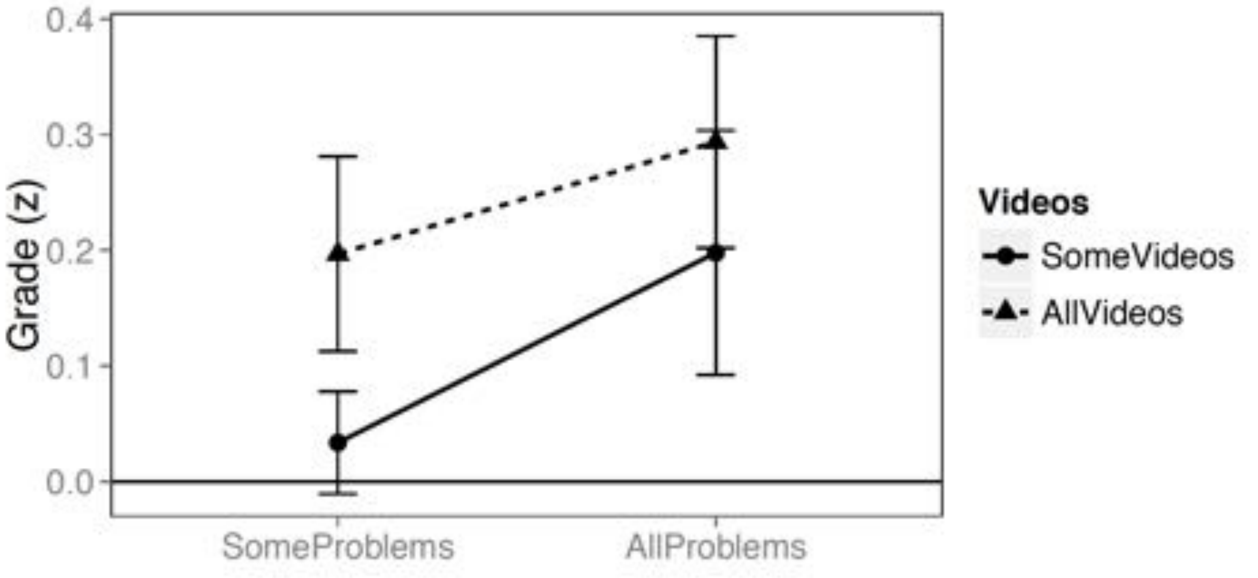


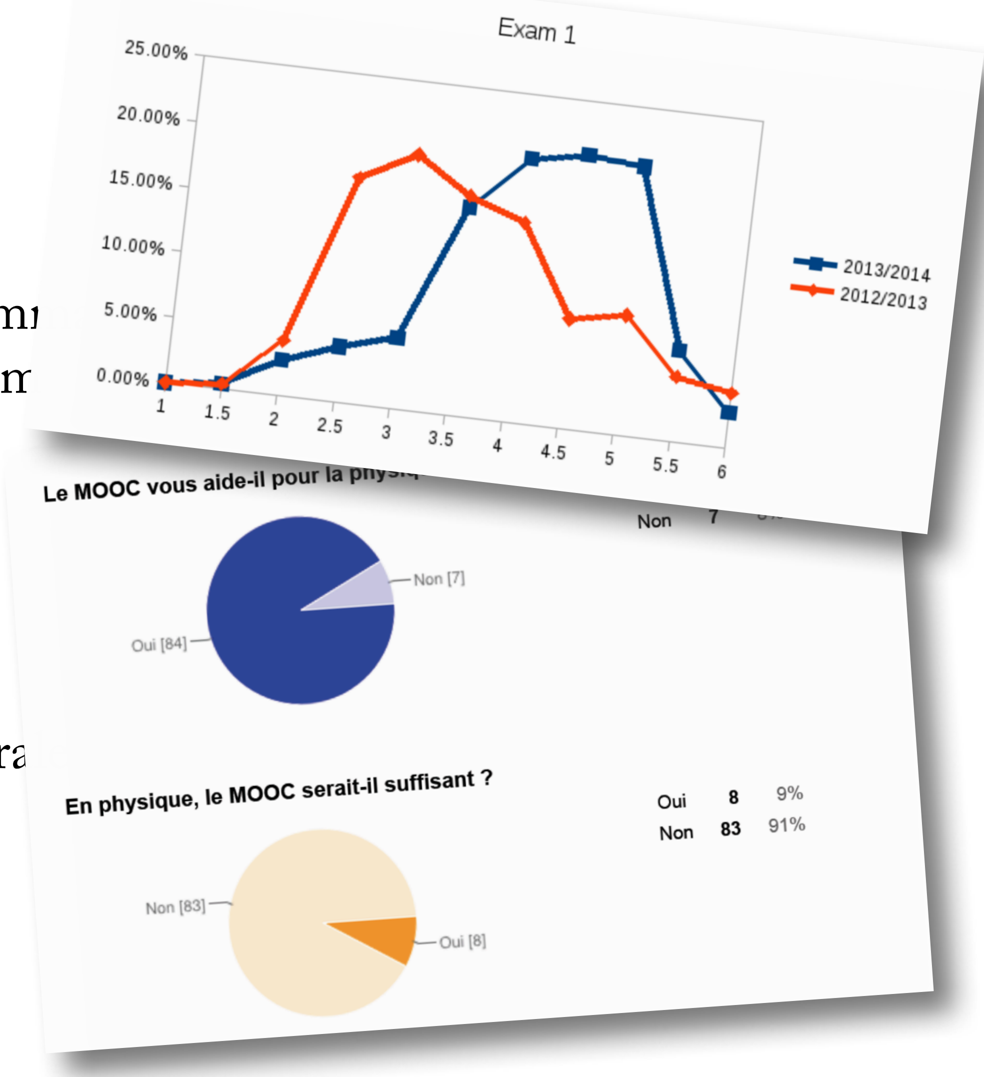
Figure 6: Normalized grades (z-scores) and MOOC activity. Students who watch all videos obtain better grades than those who watch only few videos (F[1,2883]=22.7, p<.00). Similarly, students who complete all assignments obtain better grades than those who solve only some problems (F[1,2883]=9.0, p<.00).

« Flipped Class »

Introduction à la programm
J.-C. Chappelier & J. Sam

MOOC Physique Généra
J.-Ph. Ansermet

Standard Lecture



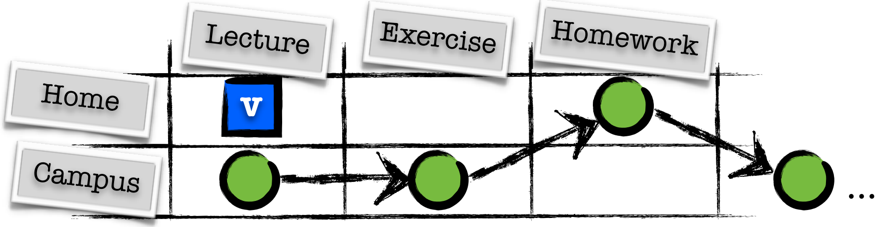
Le MOOC vous aide-il pour la phys

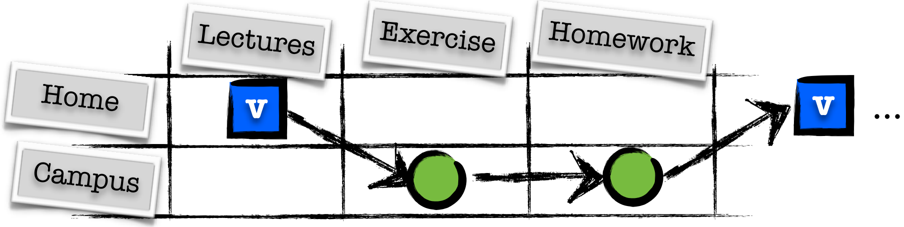
Non 7

En physique, le MOOC serait-il suffisant ?

Oui	8	9%
Non	83	91%

Course formats …





- Status quo (bachelor ?)
  - Have a ex cathedra lecture
  - Propose the video as an optional complement
  - Students use the video as an open resource

+ does not require self-directed students

- decouples the online and on campus moocs

- Flipped classroom
  - Mandatorily watch video before the class
  - Organize sessions to deepen knowledge
  - Best format has to be optimized
  - Students are better prepared for exercises

+ More effective learning

- Costly in human coaching and logistics

On campus integration : course (re-) design

- Flipping = Watch lectures at home
  - More time on campus for other activities
  - Gilliéron & Kayal : more time for labs
- Flipping ≠ No more lecturing
  - Chappelier: deepen and explain concepts
  - Picasso: start exercises with students
  - Odersky: use week$_{n-1}$ to teach week$_n$
- MOOCs is more than videos
  - Automatic grading => infinite feedback
  - Remote labs => data driven teaching

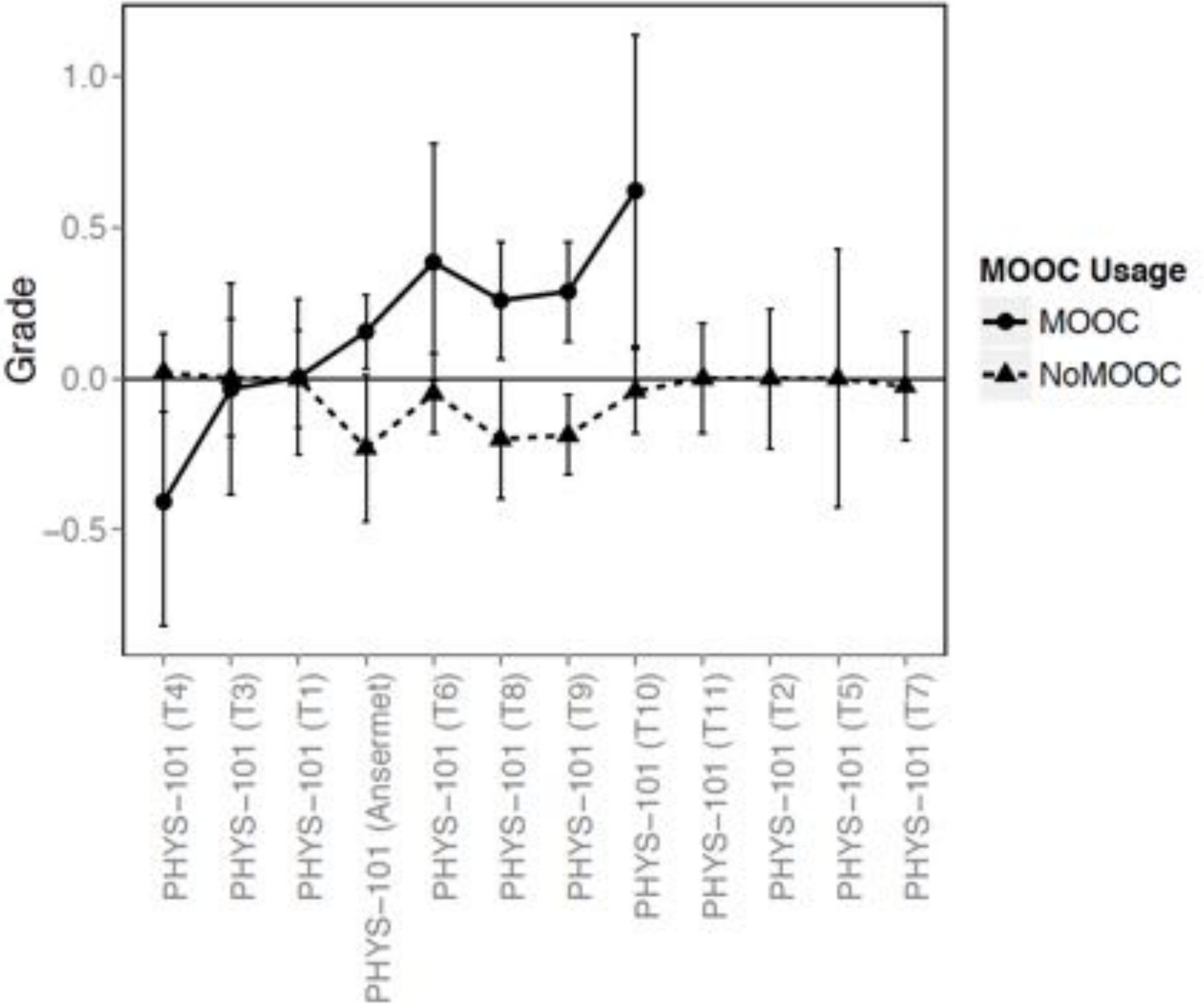
- Bologna Constraints
  - 1 credit = 30 hours of work
    e.g. 3 credits = 90 hours total
    = 6 hours per week
- Course formula
  - *x* on campus + *y* at home
  - theory + skills
  - lecture + exercice + lab + assignment + project + ...
  - staff and rooms

PHYS-101

- N=1795

- 1 MOOC teacher
- 11 colleagues

- 4 positive effects
- 4 no-effect
- 4 no MOOC use



PHYS-101

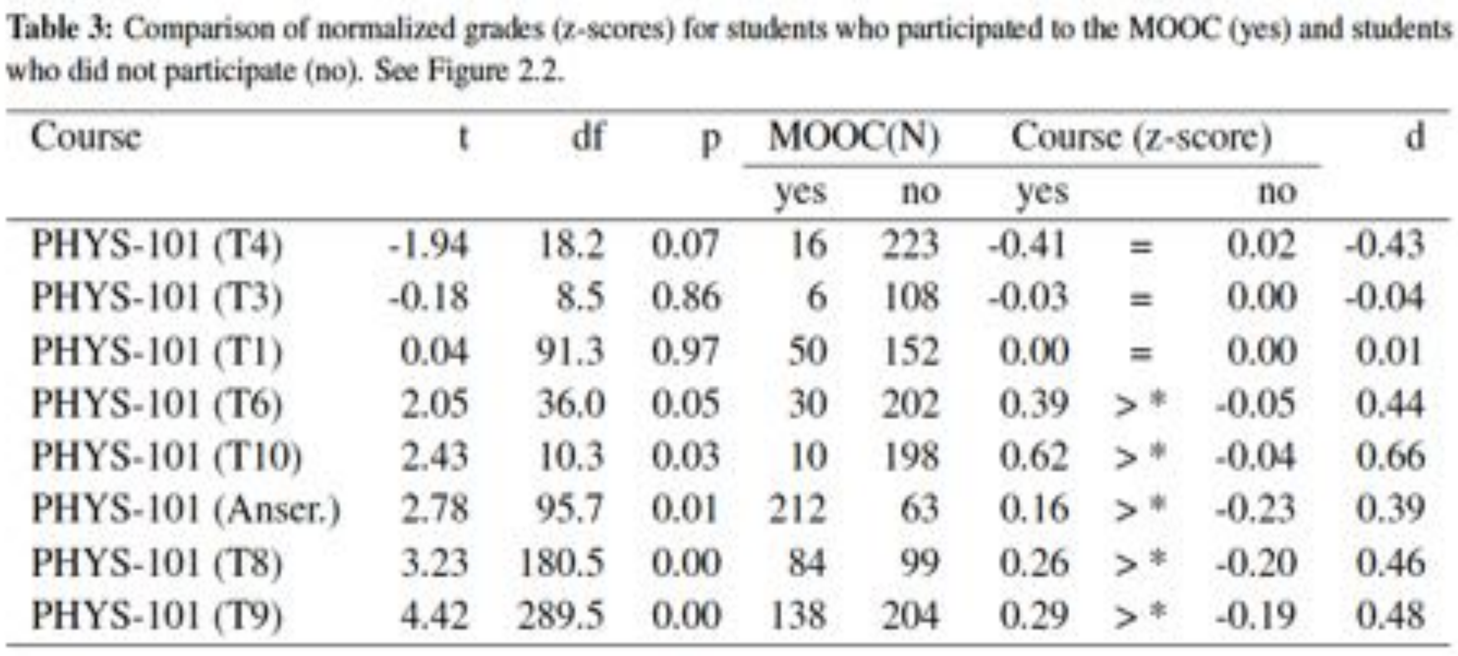
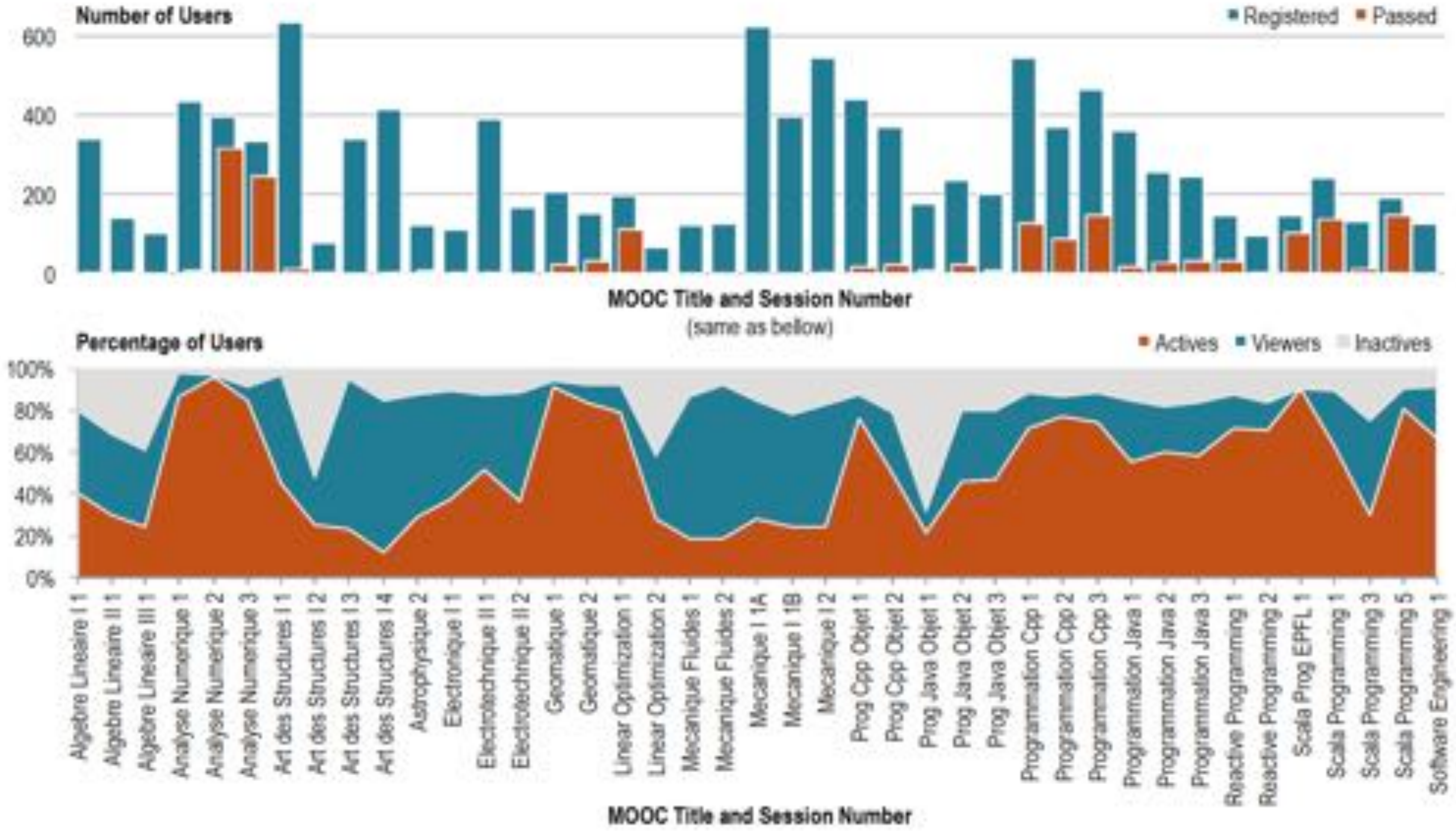


Table 3: Comparison of normalized grades (z-scores) for students who participated to the MOOC (yes) and students who did not participate (no). See Figure 2.2.

Course	t	df	p	MOOC(N)		Course (z-score)			d
				yes	no	yes		no	
PHYS-101 (T4)	-1.94	18.2	0.07	16	223	-0.41	=	0.02	-0.43
PHYS-101 (T3)	-0.18	8.5	0.86	6	108	-0.03	=	0.00	-0.04
PHYS-101 (T1)	0.04	91.3	0.97	50	152	0.00	=	0.00	0.01
PHYS-101 (T6)	2.05	36.0	0.05	30	202	0.39	> *	-0.05	0.44
PHYS-101 (T10)	2.43	10.3	0.03	10	198	0.62	> *	-0.04	0.66
PHYS-101 (Anser.)	2.78	95.7	0.01	212	63	0.16	> *	-0.23	0.39
PHYS-101 (T8)	3.23	180.5	0.00	84	99	0.26	> *	-0.20	0.46
PHYS-101 (T9)	4.42	289.5	0.00	138	204	0.29	> *	-0.19	0.48

EPFL Students engage with MOOCs … if it pays



MOOC for Credits

- Certificate of Open Studies (COS)
  - Continued education ***EPFL*** credits
  - Equivalent to 10-30 ECTS credits
  - Open for ***anyone*** to participate
  - Requires ***in situ proctored*** exam
  - Each exam gives an “attestation de réussite”
- In preparation
  - Gestion et planification de la ville africaine
  - Gestion des aires protégées (en construction)
  - Eau, assainissement et santé – WASH (en construction)

- PhD students can take MOOCs
  - Doctoral School Credits
- Virtual Erasmus
  - Level = Advanced Courses = complementarity
  - Timing of Exams = on demand MOOCs
  - Partnership = MOOC level selection
  - Assessment = university corrects 10 copies
  - Platform independent
- In preparation
  - Test with X, Delft, KTH, EPFL, …
  - 10 courses
  - 10 written exams or 5 oral exams

Production

Rationale

- The teachers are the drivers
  - We provide a **template** and
    teachers prepare their slides
  - We **coordinate** the production
  - We setup the studio and
    teachers record alone
- Supporting “Presence”
  - Teachers’ image on the slides
    at the beginning and at the end
  - Pointer and Invisible Hand Effect during explanations
- Inform design with research

François Gallaire

ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE

Eye tracking experiment on MOOC Video

Following teacher’s references

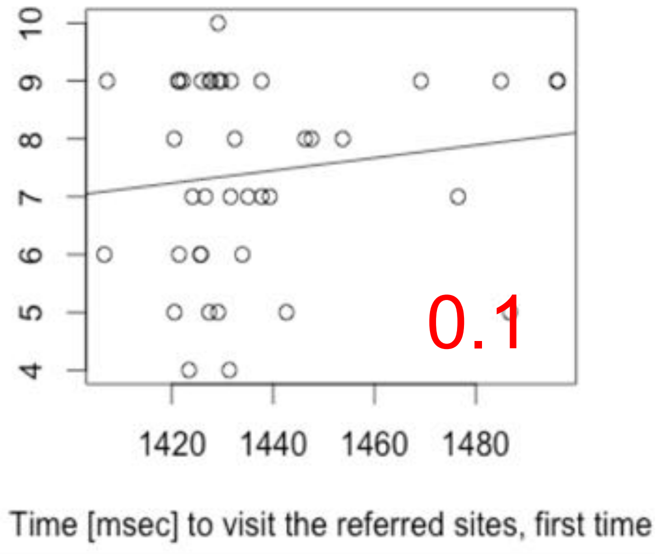
Gaze of students' watching Scala course by Prof. Martin Odersky (EPFL, Switzerland)

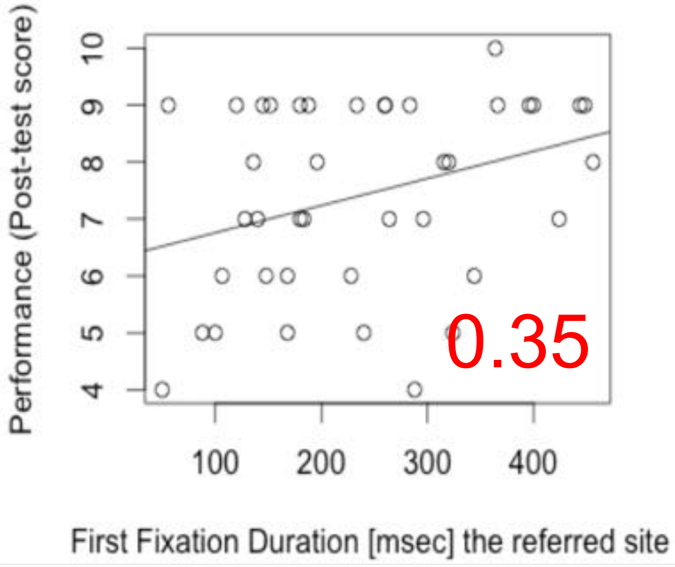
ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE

K. Sharma, P. Jermann, P. Dillenbourg
@ CHILI – http://chili.epfl.ch

Supported by the Swiss National Science Foundation
(Grants CR1211_132996 and PZ00P2_126611)

« withmeness »

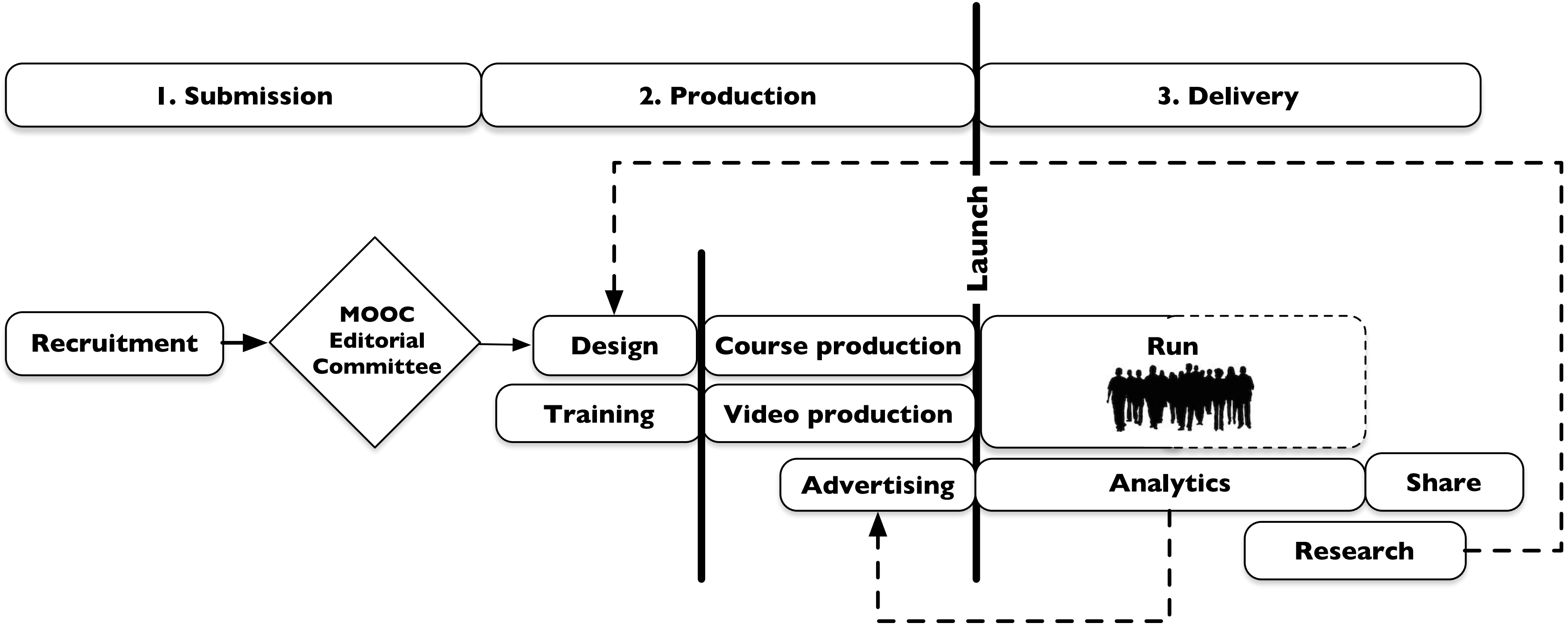




Kshitij Sharma, Patrick Jermann, Pierre Dillenbourg

EPFL Center for Digital Education

MOOC Production Process



First of all, a human adventure

Paolo Germano

Yves Perriard

Three (complementary) design philosphies

- Instructional design
  1. Start from course objectives
  2. Define learning outcomes
  3. Design learning activities
- Content based
  - Start from list of chapters and sections
  - Cut the material into small pieces
- Product based BESTSELLER
  - Start from the elements of the MOOC
  - 7 times 5 videos of 12 minutes
  - 7 assignments & 7 quizzes
  - 1 mid-term exam and 1 final exam

- Questions I ask teachers …
  - What is special about your course ?
  - What kind of assignments do you do ?
  - Are you using simulations ? Demonstrations ?
  - Do you want to grade exercises ?
  - How will the MOOC be used on campus ?
  - Who is the course for ?
  - What language ?

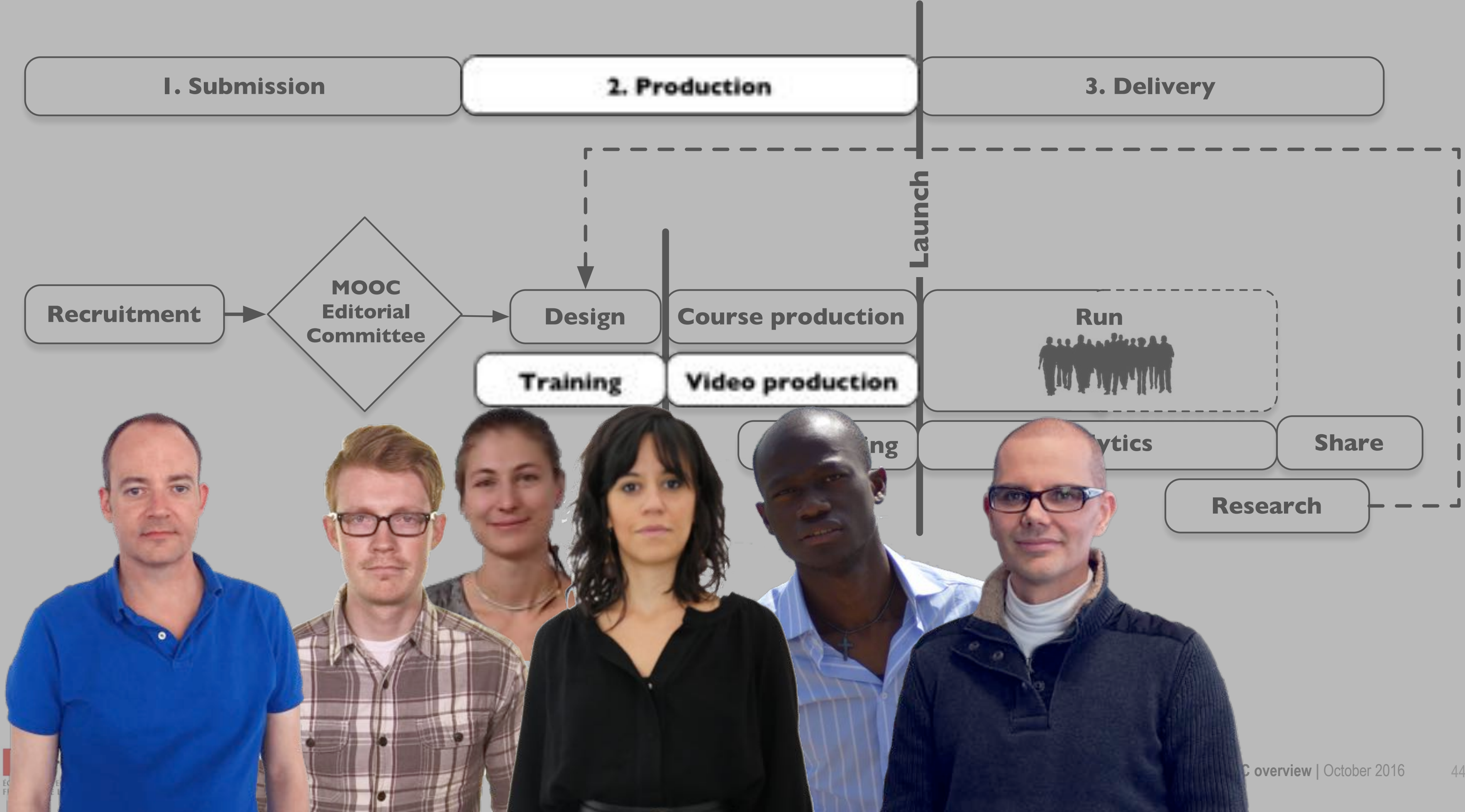
- Things I give them
  - Production schedule
  - Powerpoint & Latex template

What is special about your course / domain ?

- Use the MOOC to innovate
  - Try to find a technical and/or pedagogical innovation to test in each MOOC
  - Use the possibilities of online tools to enrich traditional teaching.
- Match the tools of the trade with course components e.g.

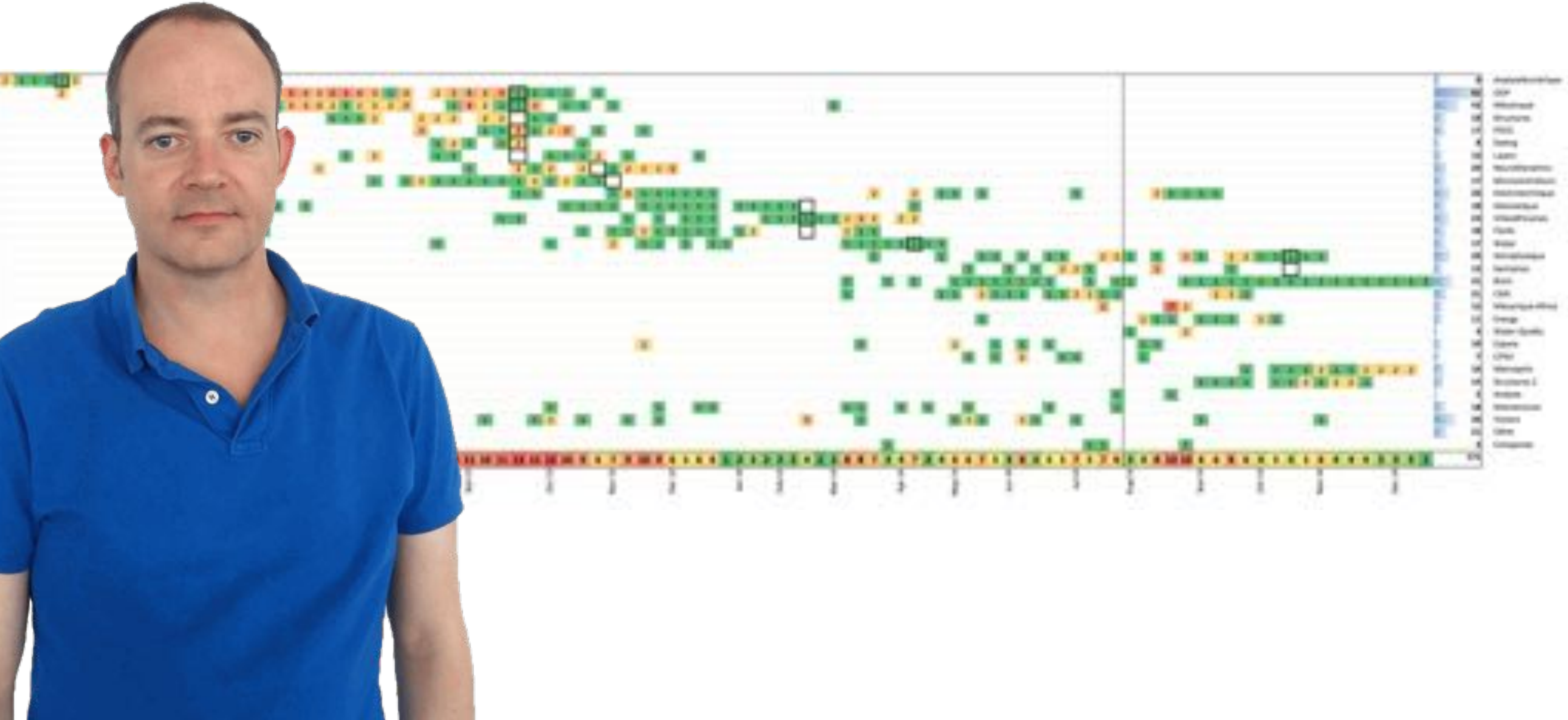
a) compilers b) technical drawings c) pictures d) mathematical formulas e) simulations f) site visits g) reading notes, etc.

- Pedagogy
  - In geomatics, the MOOC allows the teachers to save time for practical work on campus.
  - In fluid mechanics, teachers developed a remote experiment http://128.178.27.98:8082/LHE1.html
  - In computer science, teachers correct exams automatically
- Video tricks
  - In astrophysics, the teacher will stand inside pictures of the sky
  - In civil engineering, students see the teacher drawing schemas


1. Submission
2. Production
3. Delivery
Launch
Recruitment
MOOC Editorial Committee
Design
Course production
Run
Training
Video production
ing
ytics
Share
Research

Production manager

[Gwenaël Bocquet]



Video Editor and Studio host

[Matthew Goodman, Magali Croci
Cibelle Avelino, Eloge Seri]

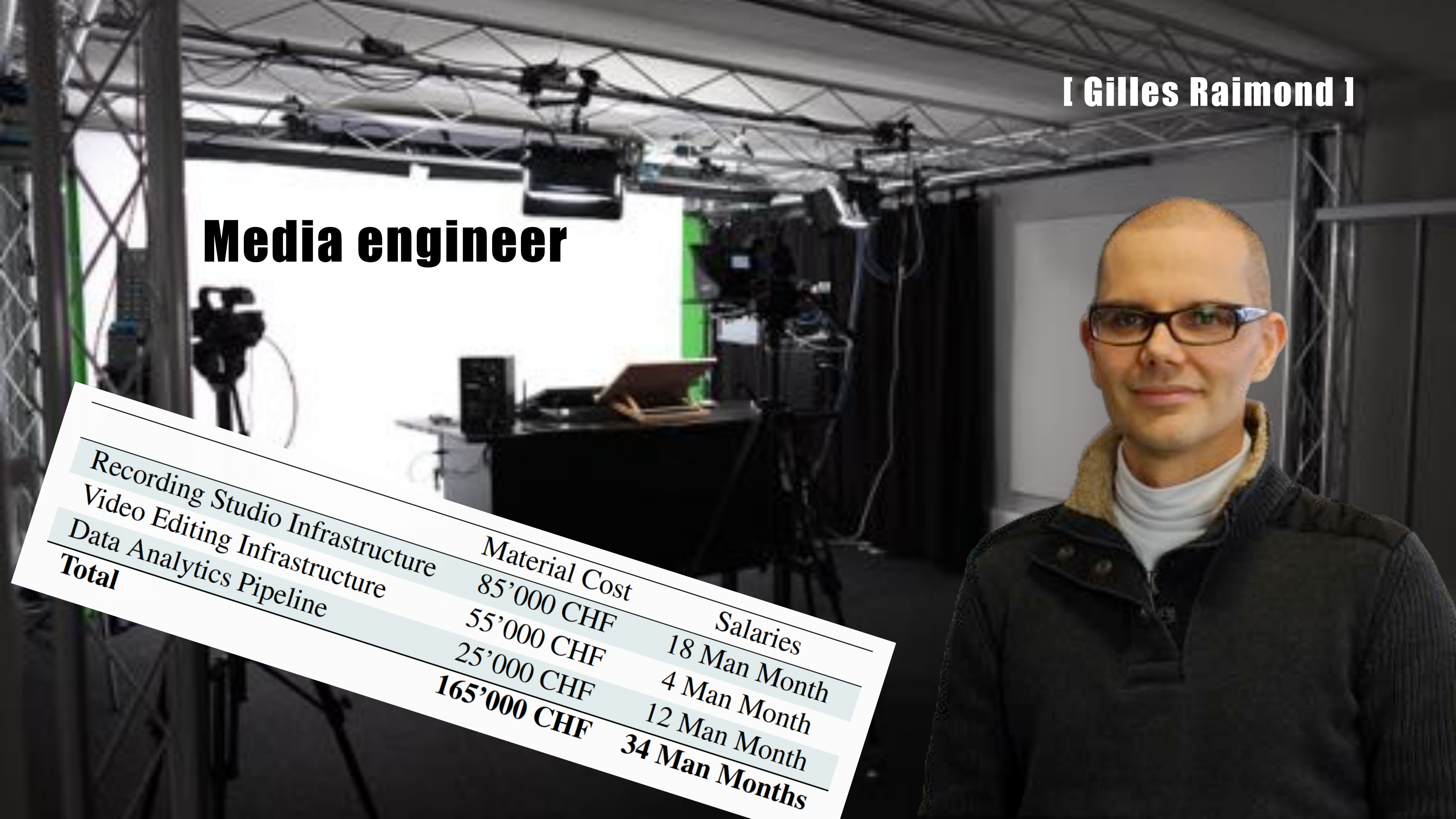
What is a signal?

Description of the evolution of a physical phenomenon

Examples:

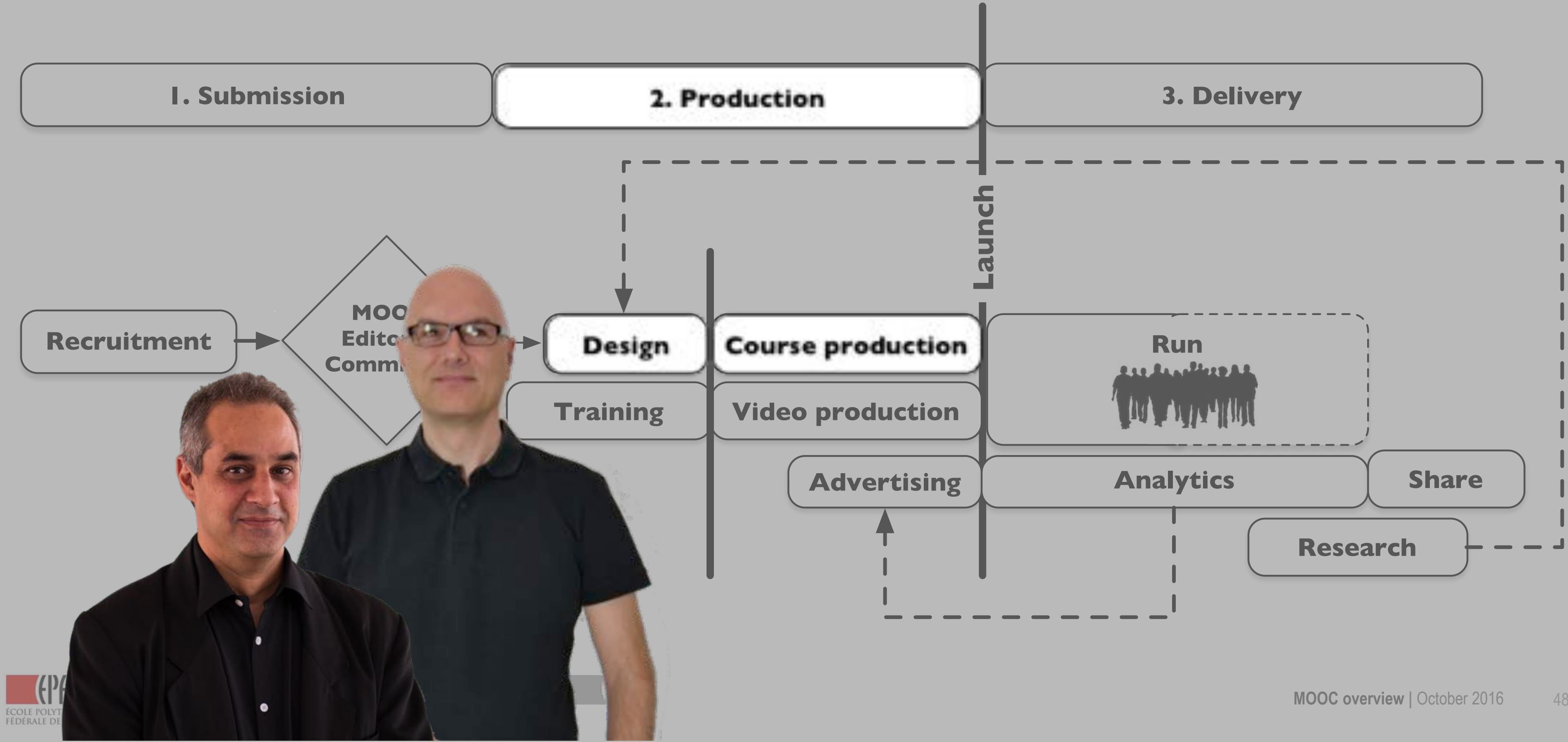
Media engineer

[Gilles Raimond]



	Material Cost	Salaries
Recording Studio Infrastructure	85’000 CHF	18 Man Month
Video Editing Infrastructure	55’000 CHF	4 Man Month
Data Analytics Pipeline	25’000 CHF	12 Man Month
Total	**165’000 CHF**	**34 Man Months**

MOOC Production Process



1. Submission

2. Production

3. Delivery

Launch

Recruitment

MOO
Edito
Comm

Design

Course production

Training

Video production

Run

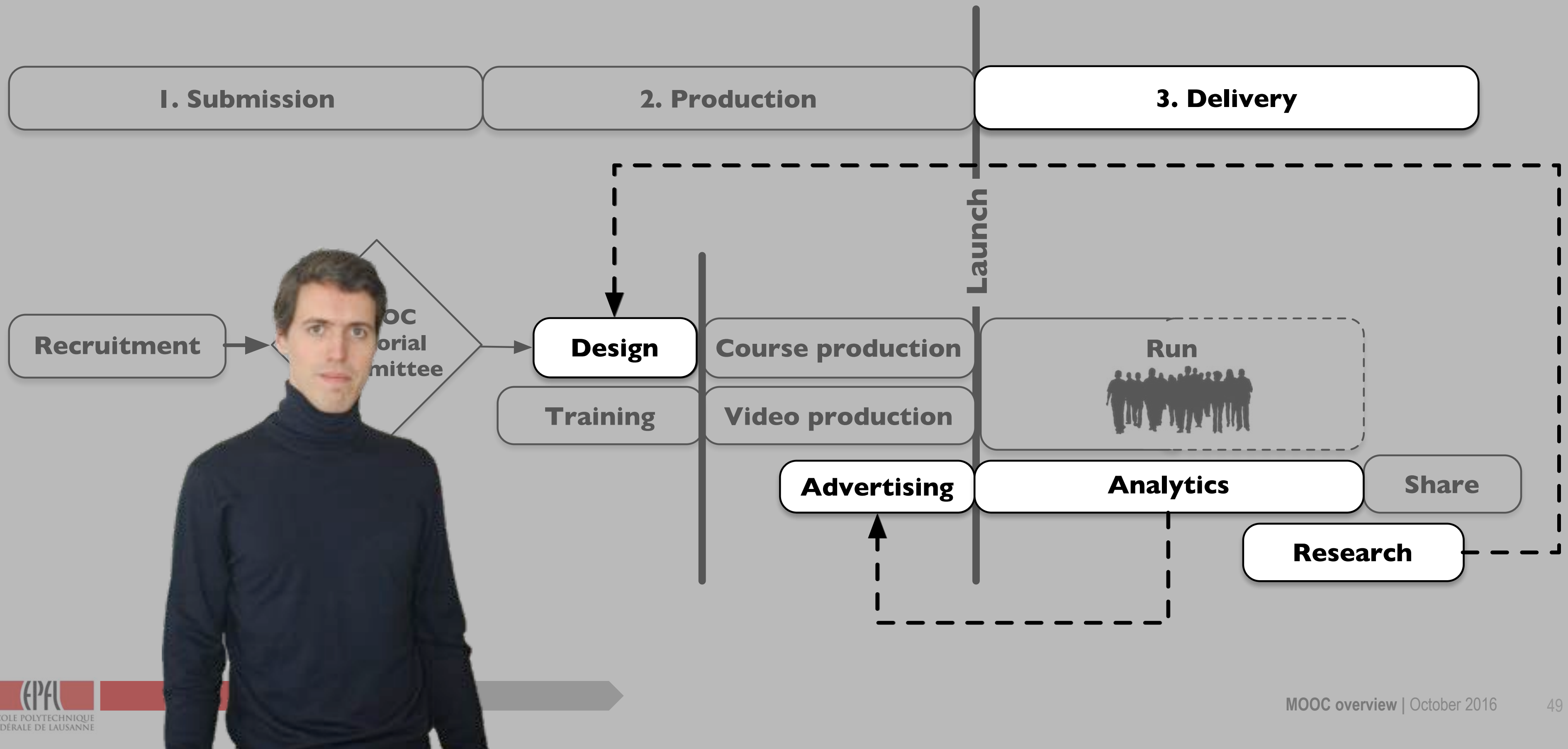
Advertising

Analytics

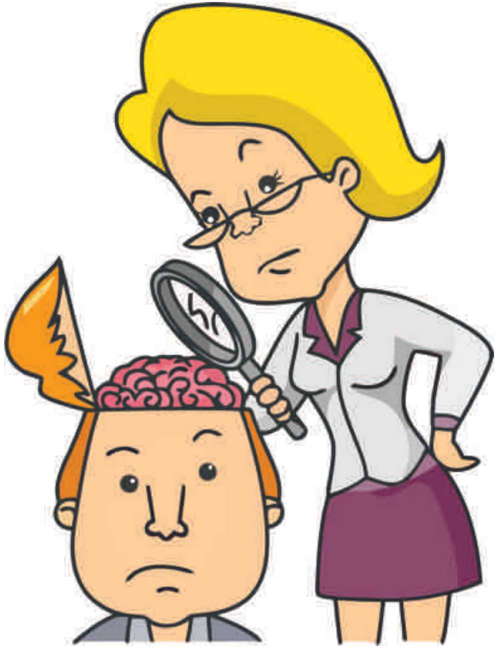
Share

Research

MOOC Production Process



Project



Behavioral Modeling

- How students learn
- Which methods get higher grades
- What causes dropouts

Learning Path

modeled by **Time Series**

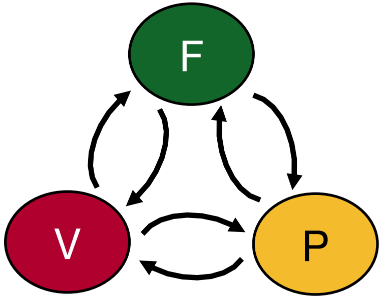
User 1	V	F	F	F	P	F	F	V	F	V	P	F			
User 2	V	V	P	V	V	V	P	V	V	V	P	V			
User 3	V	P	V	P	V	P	V	P	F	P	V	P			

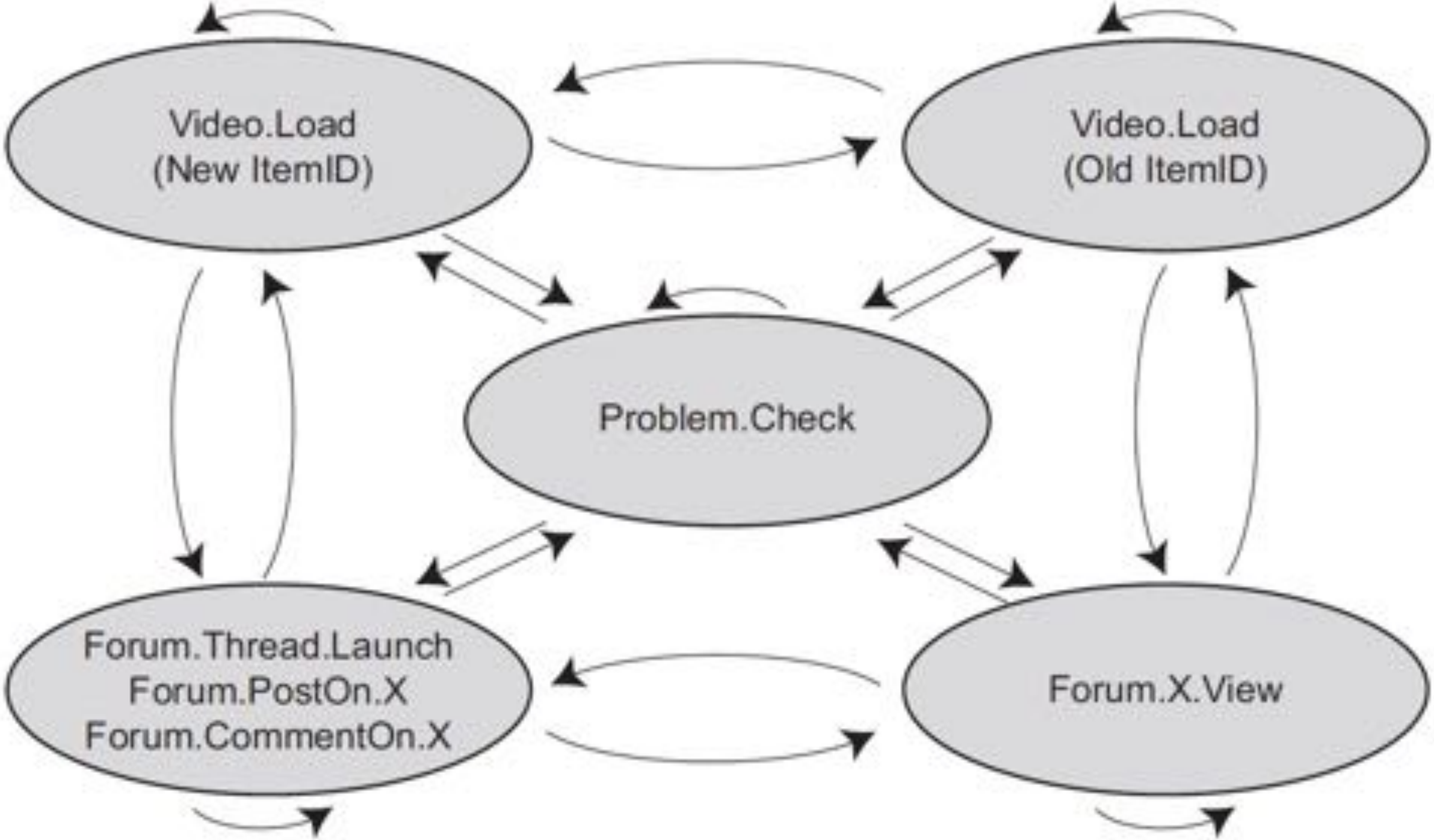
⋮

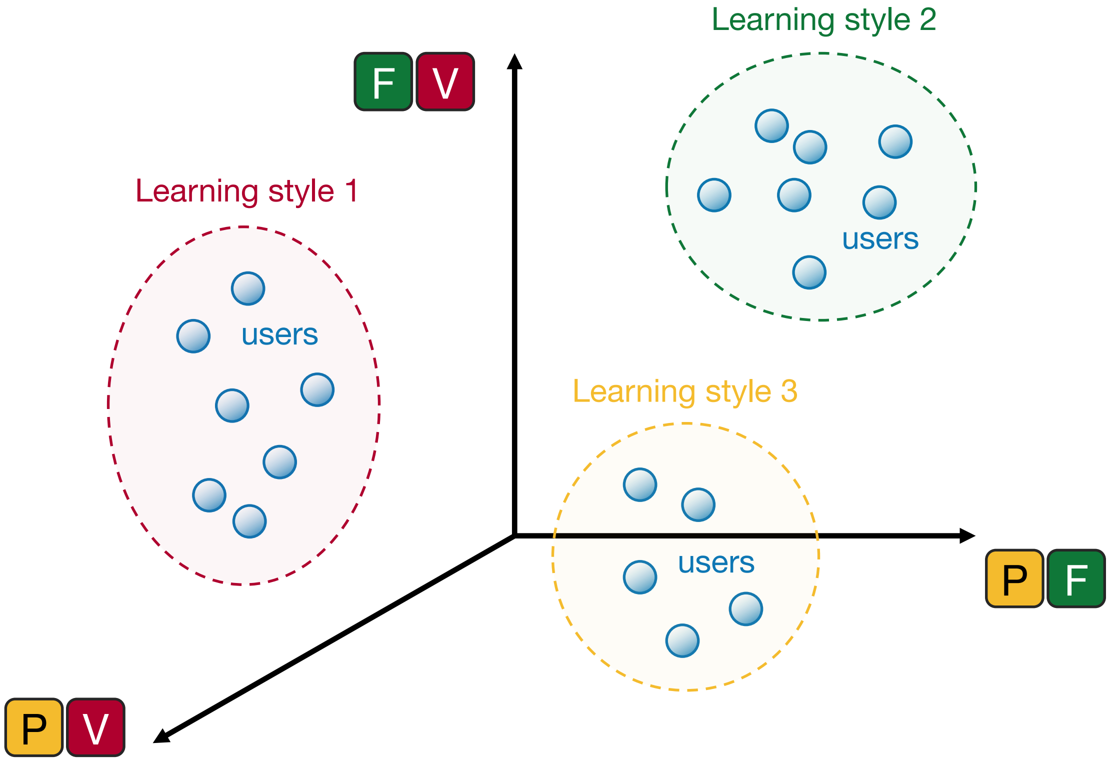
User 1,000,000

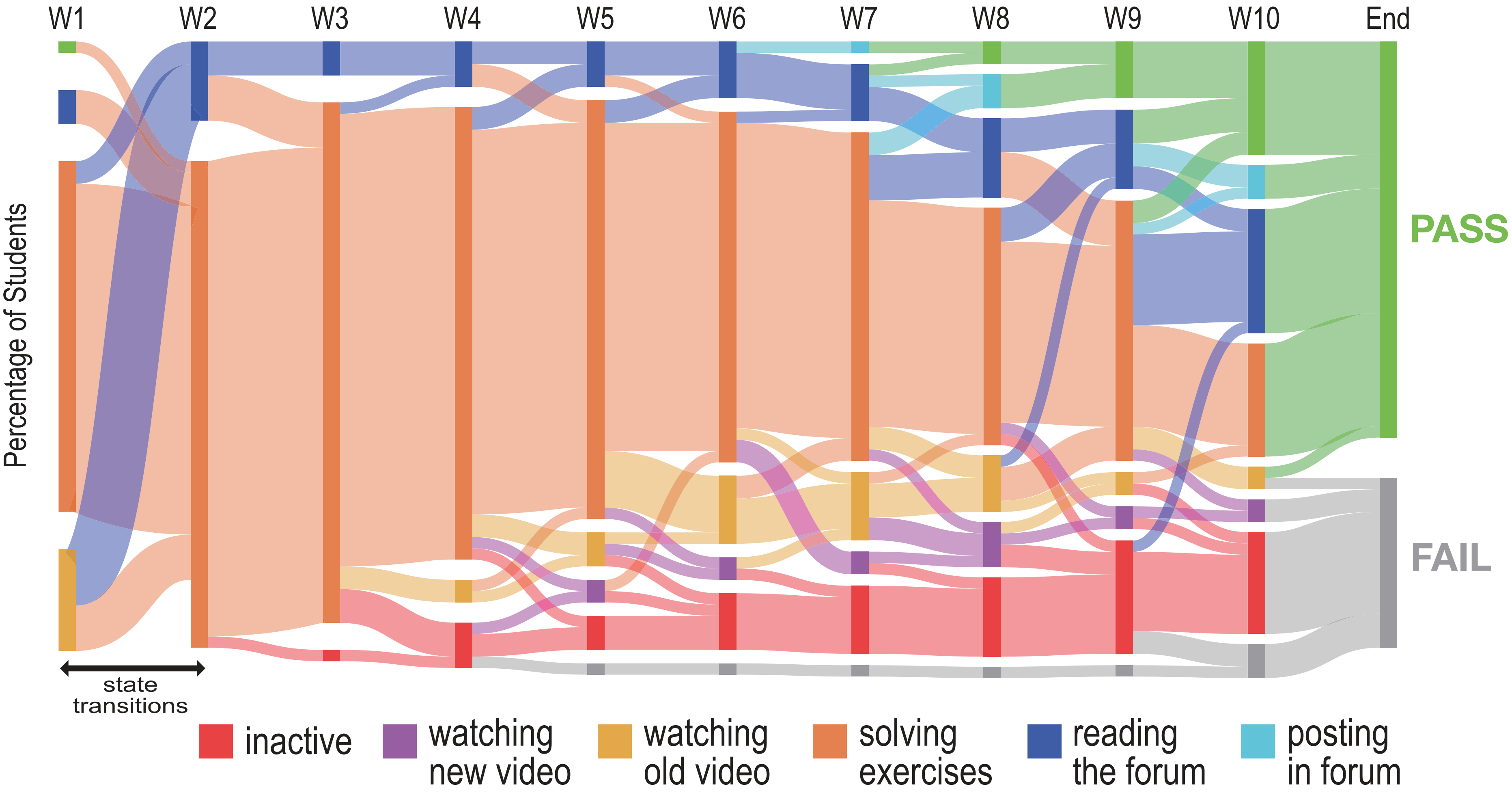
Learning Path

modeled by **Markov Chain**




Video.Load (New ItemID)
Video.Load (Old ItemID)
Problem.Check
Forum.Thread.Launch
Forum.PostOn.X
Forum.CommentOn.X
Forum.X.View


Learning style 2
F V
Learning style 1
users
users
Learning style 3
users
P F
P V


W1
W2
W3
W4
W5
W6
W7
W8
W9
W10
End
Percentage of Students
PASS
FAIL
state
transitions
inactive
watching
new video
watching
old video
solving
exercises
reading
the forum
posting
in forum