PhD Candidacy Exam Overview

phd.epfl.ch/edic/requirements

EDIC

Doctoral Program in Computer & Communication Sciences

ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE
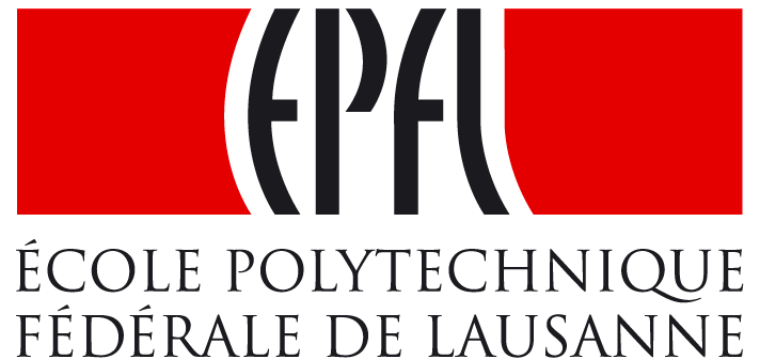
Reminder: The fantastic 2

Cecilia Chapuis
Admission
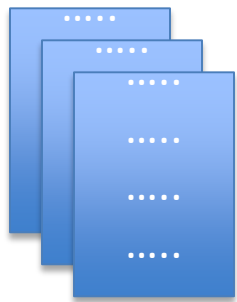1st year students
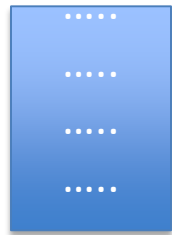Candidacy exam

Corinne Degott
General admin
Courses
Students from 2nd year

In case you have questions!

Candidacy Exam: the Big Picture
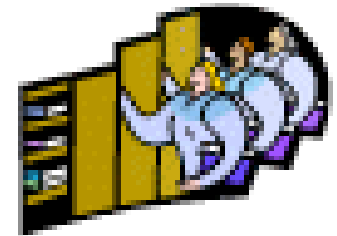

3 background papers

student write-up (4-8 pages)

90 min oral exam

3 (or 4) - member Committee

Exam contents: this + fundamental background

30 min talk + Q&A

Advisor (+ co-advisor if applicable) + two faculty in related areas

Candidacy Exam: the Philosophy

- **After one year of PhD you can**
  - read, understand and explain technical papers
  - present them briefly and explain how they influence your work
  - Answer questions about the papers, your write-up and BS/MS basic background material in the area

- **Exam focused on**
  - Presentation, submitted material + basic background
  - Both depth and breadth

- **What this exam is not**
  - A comprehensive exam for all work in an area
  - Anything the faculty feel "you ought to know"

3 Background Papers

- **3 papers providing background for your work**
  - Defining the context, general problem, alternative solutions and plans for extension

- **Paper selection guidelines**
  - You select with advisor's input
  - Conference/journal papers, thesis chapters, tech. reports
  - No paper with examinee as co-author
  - Two papers max. with authors from EPFL
  - One paper max. with a committee member as an author
  - Total length of 3 papers not to exceed 60 pages

Student's Write-up
phd.epfl.ch/edic/requirements

- **Explain background (3 papers) + your work for committee**
  - 4 to 8 pages
  - to evaluate your writing skills
  - to see how your work is related to the background
- **Format**
  - IEEE conference standard, two-column format to
    - describe the area
    - relate solutions in papers to your work
    - present your own work
  - Must be delivered with a cover page entitled "Candidacy exam: research plan" to be uploaded from ISA (available April 2016)
  - Click on "write-up format & style file" on requirements page
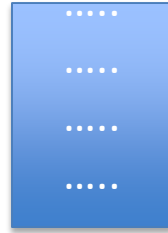- **Serves as EDOC research proposal requirement**

Write-up: Suggested Format

First page	In-between pages	Last one or two pages
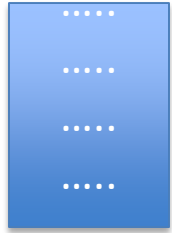
Abstract + introduction – Describe briefly the context, the problem, shortcomings in prior approaches, and your proposed approach and solution. Forecast results.

Background – Describe the three papers in more detail, the problem they tackle, the solutions and results, and their shortcomings, and how they relate to your work.
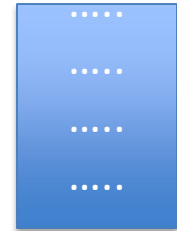
Your own work + summary and references – write how you propose to advance the state of the art given the background, what is new technically, how it improves over prior work, and present evaluation. Summarize and list references.

Committee & Date/Time

- **Your advisor(s) + 2 faculty in the or a related area**
  - Faculty to read your papers and write-up
  - Listen to your presentation, ask questions
  - Evaluate your write-up, presentation, and answers

- **Your advisor with your input must set date & time**
  - Make sure committee members are available and commit

Committee Selection Process

3 (or 4 with a co-advisor)

Your advisor/thesis director

- Co-advisor (if applicable)

You and advisor select two members

- An Exam president
  - Must be assistant (PATT), associate, adjunct, or full professor, or MER
  - Check **phd.epfl.ch/edic/research** for a list

- A Co-examiner must be from EPFL & PhD

Candidacy Exam Proposal Form
phd.epfl.ch/edic/requirements

- Upload the "Candidacy exam proposal form" from IS-A (will be available in April 2016)
- Examinee announces exam to EDIC
  - two months prior to exam day
  - after having selected
    - committee
    - date/time/room
    - three papers
    - write-up title
- Has to be signed by examinee and advisor(s)
- Submit to cecilia.chapuis@epfl.ch

Candidacy Exam: the Exam Day

90-min oral exam
- First 30 minutes: public
  - Give a presentation
  - Committee may ask clarification questions
  - Public can ask questions
- Followed by up to 60 minutes: private
  - Questions from the committee
  - About the write-up, 3 papers, basic background
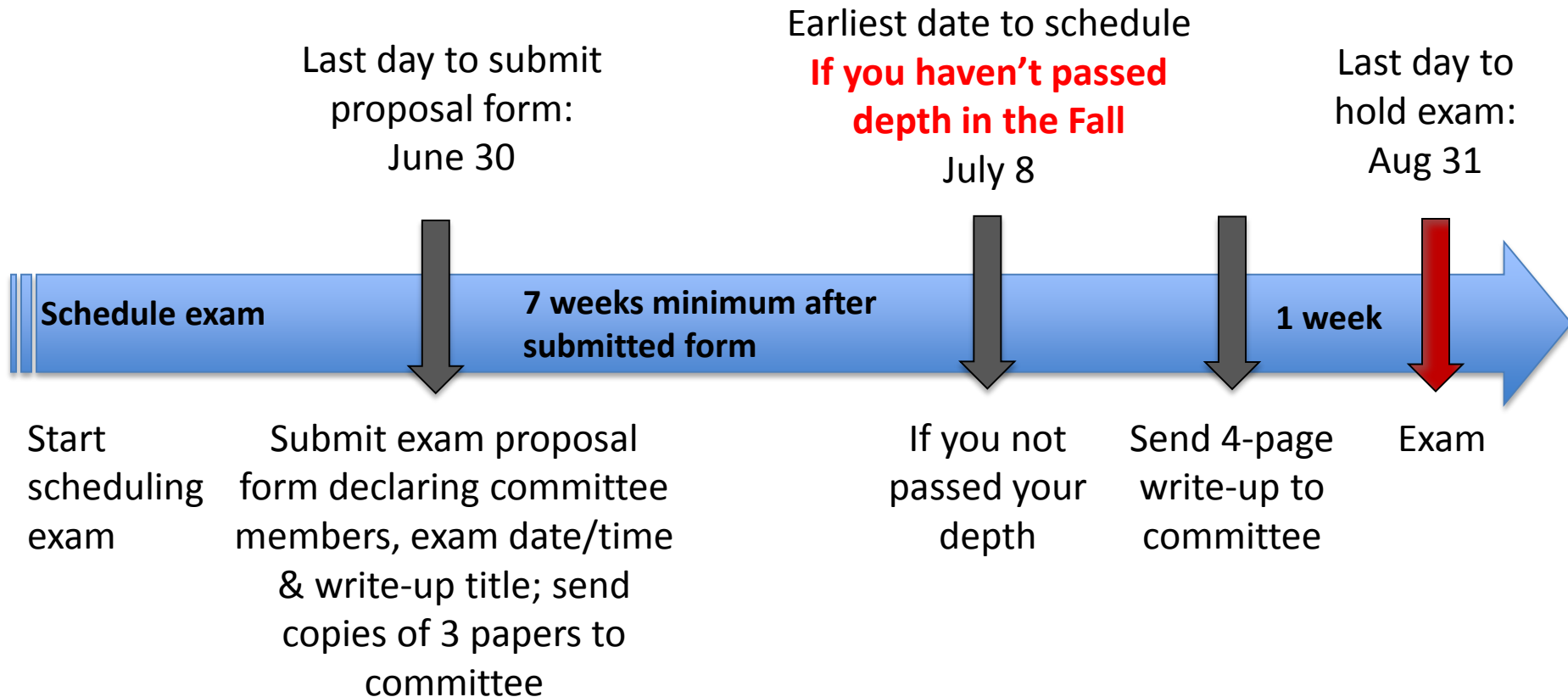 - This part of the exam is private
- Result announced same day

Scheduled for 2 hours
- Exam allowed to stretch a bit
- Discussion among the committee after the exam

Exam Evaluation Criteria

- Writing skills
- Oral skills
- Breadth of knowledge
- Depth of knowledge
- Ability to interpret results
- Critical thinking & problem-solving skills

Scheduling the Exam

Last day to submit proposal form: June 30

Earliest date to schedule **If you haven't passed depth in the Fall** July 8

Last day to hold exam: Aug 31

Schedule exam

7 weeks minimum after submitted form

1 week

Start scheduling exam

Submit exam proposal form declaring committee members, exam date/time & write-up title; send copies of 3 papers to committee

If you not passed your depth

Send 4-page write-up to committee

Exam

NOTE: We strongly recommend that you schedule your exam before July to avoid work permit issues

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Scheduling the Exam (Cont.)

- **Submit proposal form any time**
  - from beginning of spring semester
  - by June 30
  - i.e., last day to take the exam: August 31

- **Schedule as early as possible**
  - get faculty to commit to time/day
  - waiting causes scheduling conflicts
  - if failing the exam, must pass retake within three months!

Scheduling the Exam (Cont.)

Haven't passed a depth course yet?

- Must pass one in spring (last chance)
  - Need a grade of 5
  - No retakes

Must choose an exam date starting July 8
  - After grades are available

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Candidacy Exam Retake

- May change most info on proposal form
  - 2nd (or 3rd if there is a co-advisor) committee member, papers, write-up

- Must retake and pass by November 30
  - Student contract extended up to November 30

- Advisor financially responsible after August 31
  - Signing the proposal form indicates commitment to support student up to end of retake

Reminder on Course Requirements
phd.epfl.ch/edic/requirements

You will graduate with both depth & breadth
- Depth: Want you to be expert in your area
- Breadth: Want you to know a bit outside area

Depth:
- 1st year, focus on research, depth course, semester projects, candidacy exam
- after 1st year, research + breadth

Course Areas: Depth & Breadth

Candidacy Areas: AI, Systems, Theory

1. Depth (1st year)
   – Choose a depth area (one of above 3)
   – Pass a depth course with a 5
   – Pass the candidacy exam

2. Breadth
   – The other 2 areas are breadth areas
   – Pass 4 credits from each of the breadth areas

Course Requirements: Credits

Need a total of 30 credits to graduate

- Semester projects (1st year) = 12 credits

- Depth course = all are 6-7 credits

- Breadth courses = 8 or more credits

- 4 other credits (flexible)

Course Requirements: Credits Students with an EPFL MS

- Most likely depth grade of 5 passed
- 1st year credit requirements
  - 12 credits of projects
  - At least 4 credits of courses in first year

Depth Courses

AI

- COM-514: Mathematical foundations of signal processing
- CS-430: Intelligent agents
- CS-433: Pattern classification & machine learning

Systems

- COM-503: Performance evaluation (not given in 2015/2016)
- **CS-422: Database systems (spring)**
- CS-471: Advanced multiprocessor architecture
- CS-472: Design technologies for integrated systems
- CS-522: Principles of computer systems

Theory

- COM-401: Cryptography & security
- COM-404: Information theory & coding
- COM-417: Advanced probability and applications
- **CS-450: Advanced algorithms (spring)**
- CS-550: Synthesis, analysis & verification (not given in 2015/2016)

Breadth Courses

AI

BIO-465 Biological modeling of neural network

COM-415 Audio signal processing and virtual acoustics

COM-514 Mathematical foundations of signal processing

CS-411 Digital education and learning analytics

CS-413 Computational photography

CS-430 Intelligent agents

CS-431 Computational linguistics

CS-440 Advanced computer graphics

CS-441 Color reproduction

CS-442 Computer vision

CS-444 Virtual reality

CS-446 Digital 3D geometry processing

CS-486 Human-computer interaction

CS-489 Personal interaction studio

EE-511 Sensors in medical instrumentation

EE-512 Biomedical signal processing

EE-513 Biometrics

EE-550 Image and video processing

EE-551 Image communication

EE-552 Media security

Systems

COM-407 TCP/IP networking

COM-413 Real-time networks

COM-414 Satellite communications systems and networks

COM-502 Dynamical system theory for engineers

COM-503 Performance evaluation

COM-511 Software-defined radio: A hands-on course

CS-410 Technology ventures in IC

CS-420 Advanced compiler construction

CS-422 Database systems

CS-472 Design technologies for integrated systems

CS-473 Embedded systems

CS-474 Microelectronics for systems on chips

CS-476 Real-time embedded systems

CS-487 Industrial automation

CS-490 Business plan for IT services

CS-491 Enterprise and service-oriented architecture

CS-522 Principles of computer systems

CS-622 Privacy protection

CS-712 Topics on datacenter design

CS-717   Current topics in distributed systems

EE-472 Smart grid technologies

ENG-466 Distributed intelligent systems

Theory

COM-401 Cryptography & security

COM-404 Information theory & coding

COM-405 Mobile networks

COM-417 Advanced probability & application

COM-421 Statistical neuroscience

COM-500 Statistical signal and data process

COM-501 Advanced cryptography

COM-510 Advanced digital communications

COM-512 Networks out of control

COM-514 Mathematical foundations of sign

COM-516 Random walks

CS-435 Analytic methods in algorithms and

CS-450 Advanced algorithms

CS-451 Distributed algorithms

CS-452 Foundations of software

CS-453 Concurrent algorithms

CS-454 Convex optimization and linear prog

CS-455 Topics in theoretical computer scien

CS-550 Synthesis, analysis and verification

CS-551 Computational molecular biology

CS-714 Games for crowds and networks

EE-731 Advanced topics in data sciences

MATH-318 Set theory

MATH-400 Advanced analysis I

MATH-401 Advanced analysis II

List online at phd.epfl.ch/edic

FAQ: Course Requirements

- Do I need to complete any courses for credits before I take the exam?
  - No
  - As part of PhD qualification though, you must take one of the courses indicated at phd.epfl.ch/edic/requirements by end of first PhD year
  - Exam scheduling is orthogonal to when you take this course

FAQ: How many times?

- How many chances do I get to pass the exam?
  - Two
  - If you fail twice, you have to leave the PhD program

- If I fail once, what happens?
  - You must schedule another exam within 3 months

FAQ: Background Papers

- What should I pick for background papers?
  - Consult with your advisor
  - Pick papers that provide a good foundation for your write-up and talk
  - Pick one "basic" paper that is tutorial or survey of the main ideas in the area, and two papers that are closer to the specific work
  - Pick at least one recent paper

FAQ: Area, Research

- Does exam have to be in my PhD research area?
  - Yes
  - Your write-up and presentation point to what area and problems you are likely planning to pursue
  - Your actual PhD plan may change over time
  - The exam is on topics where you can demonstrate depth and breadth within the scope of the background papers and write-up

FAQ: Preparation

- Can my advisor(s) help me with my slides and/or the write-up?
  - No
  - Your advisor(s) helps you with the selection of the committee members and the paper choice
  - Your advisor(s) does not correct your slides or write-up before the exam and does not participate in dry runs with you
- Can my EDIC Contact be part of the committee?
  - No

You must take your vacation

Five weeks legal holiday per year

Take your vacation days **before** you are transferred

to a lab and enter them in the online tool

http://absences.epfl.ch

Thank you for your attention