

01URRx 2023-24

# Computational Intelligence

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<https://github.com/squillero/computational-intelligence>

# Computational Intelligence

Politecnico di Torino: 01URROV

<https://github.com/squillero/computational-intelligence>

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version 1.2

## References

- Email
 

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[andrea.calabrese@polito.it](mailto:andrea.calabrese@polito.it)
- GitHub repo  
[squillero/computational-intelligence](https://github.com/squillero/computational-intelligence)
- Telegram group  
[https://t.me/polito\\_01urrov](https://t.me/polito_01urrov)



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## Computational intelligence

- You will learn to **build** “intelligent” systems
- Build: **design** and **implement** vs. tweak models

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## The BIG questions

who

when

what

why

where

how

But  
FIRST

# Rules of Engagement

- **Rule 0: Academic integrity policy**
  - Don't cheat
  - Solve together, submit alone
    - Note: up to 6 points for being “active” + 10 points for the final program
  - Declare any help received (provide refs)
    - “I worked with Alice”
    - “I copied the procedure from Bob’s repo”
    - “I found this idea on Stack Overflow”

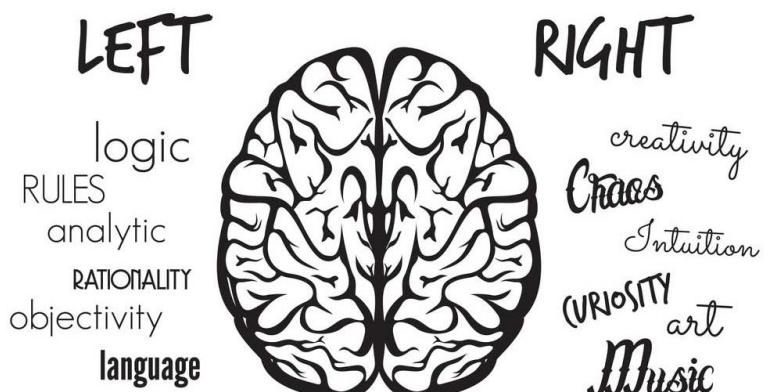
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# Gentlemen's Agreement

- **Rule 1: Language**
  - No mobiles
  - Laptops in Zen mode



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## Rules of Engagement

- **Rule 2: Attendance**
- According to Politecnico: 6 cfu = 60h + 90h

**1h lecture @ Politecnico → 1.5h study @ home**

- Your duties
  - Take notes (slides are not self contained)
  - Broaden the subjects
  - Run code and do experiments on your own boxes
  - Play with params

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## Rules of Engagement

- **Rule 2: Attendance (cont'd)**
  - Some students can't attend (for legitimate reasons)
  - Lectures will be broadcasted & recorded
  - Full support through email and the Telegram group
  - But students must participate actively  
(24h lag is acceptable — no more!)

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# Rules of Engagement

- **Rule 3: Online behavior**

- Limit the discussions to the course topics
- Show courtesy
- Use welcoming and inclusive language
- Respect different viewpoints and experiences
- Accept criticisms
- **Have a fair share of sense of humor**



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- **Rule 3: O**

- Limit the discussions to the course topics
- Show courtesy
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- Accept criticisms
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@ScottAdamsSays

Dilbert.com

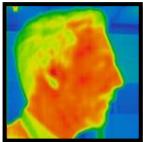


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who

# Who is this Giovanni Squillero?



Associate Professor  
of Computer Science  
@ PoliTO (DAUIN)

- Courses:
  - Computer Sciences
  - Computational Intelligence
  - Future of Work
  - Mimetic Learning
  - Object-Oriented Programming
  - Computer Architectures
  - [Uzbekistan]



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- Current ML projects
  - Test & Validation
  - Analysis of Mass Spectra (COVID)
- Current CI projects
  - Antimicrobial susceptibility from DNA
  - Artificial Intelligence (AI4MUSE)
- Research (not applied)
  - Diversity promotion in EC
  - Feature-selection in ML
  - Approximate optimization
  - Approximate subgraph equivalence
  - Estimation of Distribution EA
  - Multi-Agent Systems
  - Games/Economy/...

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- Email
- GitHub
- Telegram

Google

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- squillero polito
- squillero giovanni
- squillero github

Google 搜索

手气不错

举报不当的联想查询

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Add README

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who

# Who is this Andrea Calabrese?



Ph.D. student  
in Computer Science  
@ Polito (DAUIN)

- Courses:
  - Computational Intelligence

- Current projects
  - Pipelined/parallel optimization (CAD)
- Research (not applied)
  - Flying-probe path optimization (CAD)
  - Approximate subgraph equivalence
  - Spare GPU optimization

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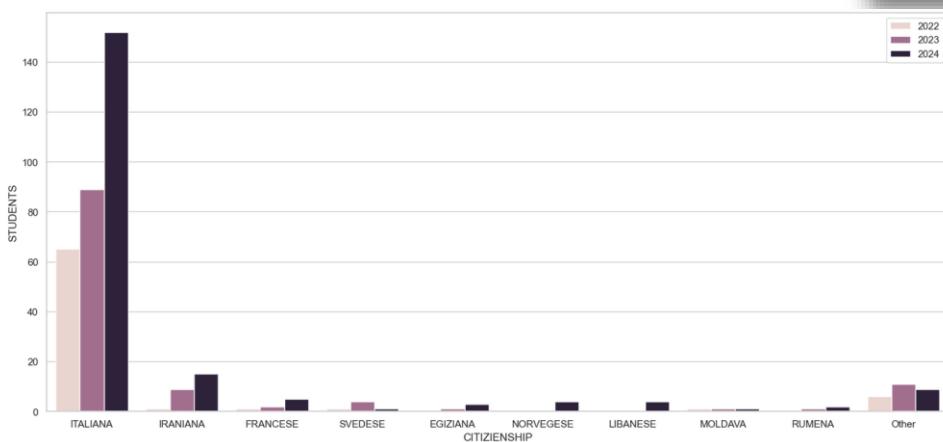
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who

# Who are you?

- 196 students (as of today, Monday October 2)



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where      when

## Lectures

	lunedì 02/10/2023	martedì 03/10/2023	mercoledì 04/10/2023	giovedì 05/10/2023	venerdì 06/10/2023
9:00					
10:00					
11:00					
Computational intelligence SQUILLERO GIOVANNI AA - ZZ TT					
12:00					
13:00					
14:00					
Computational intelligence SQUILLERO GIOVANNI AA - ZZ TT					
15:00					
16:00					
17:00					
18:00					
19:00					

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where      when

## Attendance

- Some students can't attend (for legitimate reasons)
- Lectures will be broadcasted & recorded
- Full support through email and the Telegram group
- But...
- ... students are requested to be **reasonably active**
- ... 24h lag is acceptable — **no more**

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why

## Computational Intelligence

- Why “Computational” and not “Artificial” Intelligence?

▼ Artificial Intelligence and Data Analytics Italiano, Inglese

Anno 2021/2022  
Anno 2022/2023

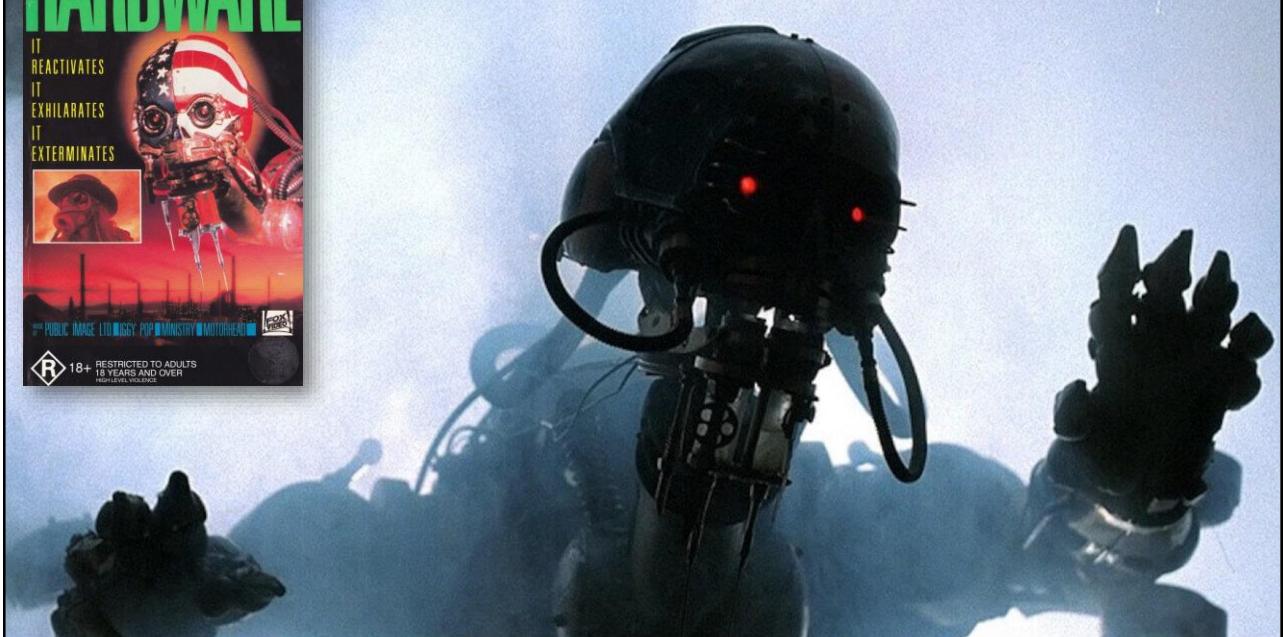
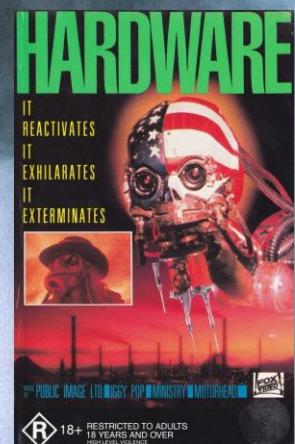
Periodo	Codice	SSD	Insegnamento	Lingua	Crediti	Docente	Note	Orario
1	01URWOV	ING-INF/05 (6)	Advanced Machine Learning	+	6			
1			Insegnamento a scelta 1	+	6			
1	01TYMOV	ING-INF/05 (6)	Information systems security oppure	+	6			
1	01IUDUOV	ING-INF/05 (6)	Sicurezza dei sistemi informativi	+	6			
1,2	03UEWOW		Challenge oppure	+	8			
1,2			Crediti liberi		6			
1,2	29EBHOV		Tesi		30			
2			Insegnamento a scelta 2		6			

▼ Insegnamento a scelta 1

Periodo	Codice	SSD	Insegnamento	Lingua	Crediti	Docente	Note	Orario
1	01TYDOV	ING-INF/05 (6)	Cloud computing	+	6			
1	01URROV	ING-INF/05 (6)	Computational intelligence	+	6			
1	01PDCOV	ING-INF/04 (6)	Digital control technologies and architectures	+	6			
1	01TXZOV	ING-INF/05 (6)	Distributed systems programming	+	6			
1	01NWPOV	ING-INF/05 (6)	Elaborazione dell'audio digitale	+	6			

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what

## What are we going to learn?

- Metaheuristics
- Solving problems by searching
  - Single-State Methods
  - Population Methods
- Representation problems
- Policy optimization
- Multi agent systems

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how

## How are we going to learn?

- To learn a **skill**
  - We need to **understand**
- To understand
  - We need to **witness**



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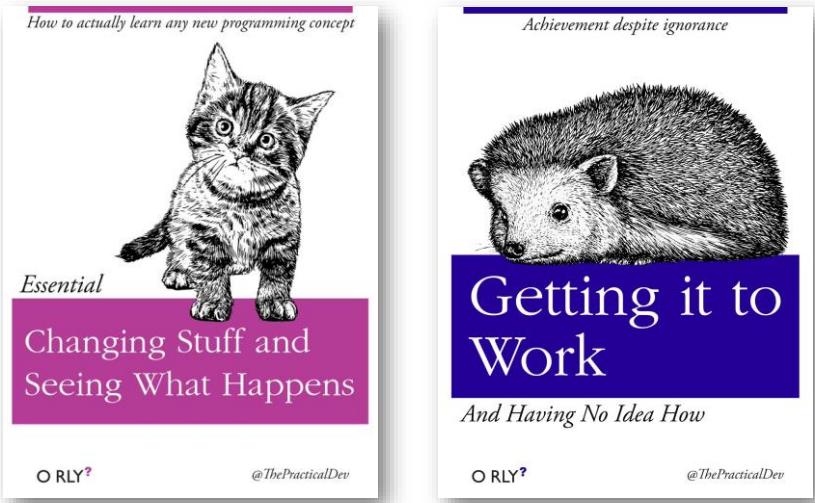
## Textbooks

- No textbook is strictly needed (as in all my classes)
- Truly remarkable books include:
  - Stuart Russel, Peter Norvig  
*Artificial Intelligence: A Modern Approach* [4<sup>th</sup> edition]
  - Gusz Eiben, James Smith  
*Introduction to Evolutionary Computing* [2<sup>nd</sup> edition]
  - Sean Luke  
*Essentials of Metaheuristics* [2<sup>nd</sup> edition]  
Note: This book is also freely available online from Sean's website  
<https://cs.gmu.edu/~sean/book/metaheuristics/>

## More Suggested Textbooks

- Truly remarkable books also include:
  - Melanie Mitchell  
*Artificial Intelligence: A Guide for Thinking Humans*

## More Suggested Textbooks



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how

## How can we get out of here?

- **During lectures:**
  - Do the suggested “homework”
  - Peer-review your colleagues’ homework
- **Final exam:**
  - Write a program able to play Quoridor

<https://en.wikipedia.org/wiki/Quoridor>

Compile a report detailing all your activities

- Oral part (we will have a problem)

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how

## How can we get out of here?

- **Peer review:**
  - Using GitHub tools
  - Goal: increase reviewer's competence and understanding
  - No one will be evaluated based on the peer reviews
  - but I will evaluate the reviews themselves**
  - and everyone will need to implement reviews**



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## Background

- Python?
- (Classical) Machine Learning?
- (Deep) Neural Networks?

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why

## Mascot

- Why an hamster?



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