<WA/>
2026

Web Applications

Introduction: organization, exam, communications

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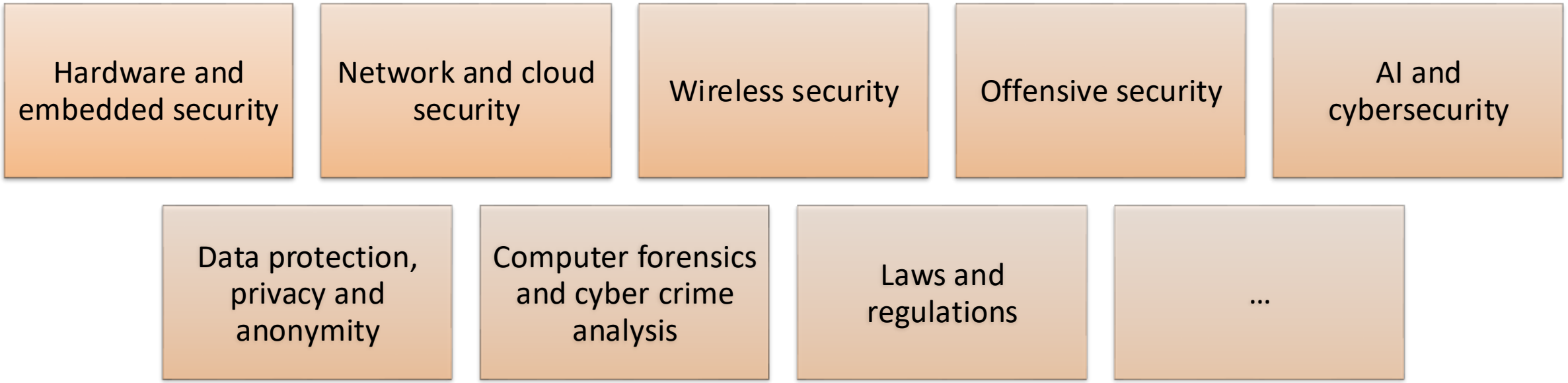
Goal

- Understanding web architectures
- Understanding and mastering web application design and development
- Gaining in-depth knowledge of the JavaScript language and ecosystem
- Becoming familiar with one of the most popular JavaScript frameworks (React) with special focus on the front-end
- Some attention on **basic** security aspects in web applications

- Official course description:
  https://didattica.polito.it/pls/portal30/gap.pkg_guide.viewGap?p_cod_ins=01GYOWQ&p_a_acc=2026&p_header=S&p_lang=EN

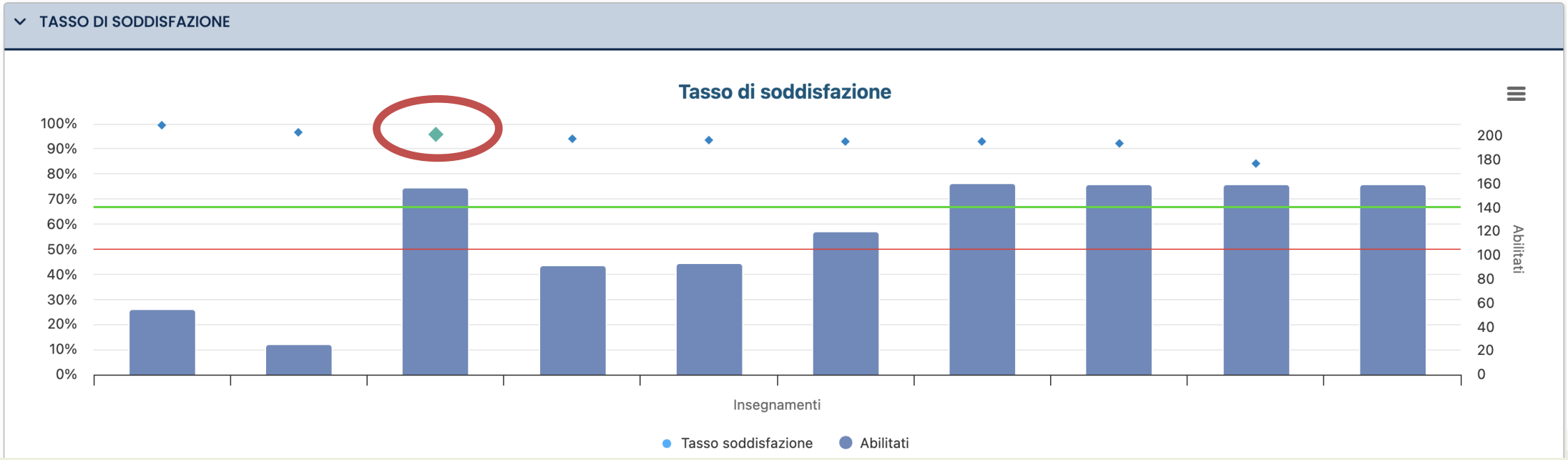
The Bigger Picture

- "Web applications" is a **basic** course in "Cybersecurity Engineering" course of study
  - Many **applications** nowadays are **web-based**: important to know their technologies
- The course of study includes many other courses regarding cybersecurity



Previous Year End-of-course Questionnaire

- Feedback from previous years (CPD / JCT): high satisfaction rate
- Most criticism about the need for better connection to cybersecurity topics
  - It is already (partially) addressed since it is an introductory course to web applications, paying attention to SOME cybersecurity aspects (e.g., server side)



What We Will Learn

JavaScript as a language

- ECMAScript ES6
- Language constructs
- In-depth semantics
- Functional, Asynchronous, Modular, …

The browser ecosystem

- HTML, CSS, page structure
- DOM
- JavaScript in the browser
- Events, Properties, Handlers, APIs

Single Page Applications

- Server-side with node (focus on security)
- API development
- Backend storage
- Sessions and Authentication

React framework

- Components, Properties, State
- JSX
- Hooks
- Router

Calendar… At a Glance!

1. Intro to JS: basics, objects, functions
2. Intro to JS: async programming, callbacks, DB interaction + Intro to Web
3. Server-side with Express; API design
4. HTML, CSS, Bootstrap
5. JS: modules and other topics, + JS in the browser
6. Intro to React
7. React: props and state
8. React: context, life cycle, forms
9. React router
10. Data fetching and client-server interaction (in React)
11. Authentication

Course Organization

- Classes
  - 6 (or 3) h/week
  - Lectures + Exercises (*mixed*)
- Laboratories (room 8i and 9T)
  - 1.5 or 1.5+1.5 h/week (using class slots)
  - 3 Lab groups (see later for the split)
  - Starting 2nd week
- **Detailed schedule week-by-week**
  - https://github.com/polito-WA-2026/.github/blob/main/profile/SCHEDULE.md

	MO	TU	WE	TH	FR
08:30				R3	
10:00				R3	
11:30					
13:00	R3			9T	
14:30	R3	8i			
16:00		8i			
17:30					

Classes

- In person, (mostly) in rooms with power outlets at the desks
  - bring your own computer, if possible, if you want to try the examples/exercises
- Video-recorded and made available soon after each class
  - *not* streamed live
- We will try to make live examples (live coding etc.) whenever possible during lectures

Laboratories

- Starting March 3, 2026
- In rooms with power outlets at the desks
  - **No computers are available in the room, bring your own**

- Text online, some days in advance
- Exercises to be done during Lab hours

- Solution will be posted on GitHub
  - 1 week (or less) after the end of each lab

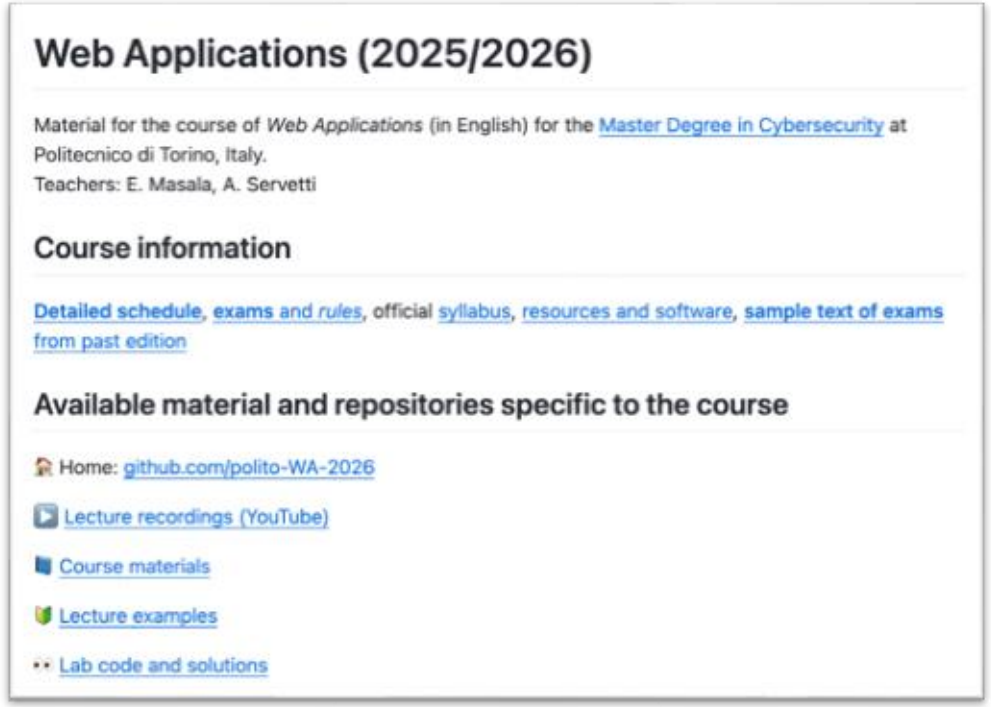
Laboratories

- You will build a simple project during the labs
  - Step by step, following the course topics
- Some labs will last one week, others will span multiple weeks

- We will start with three slots, divided by last name:
  - AA-FA : group #1
  - FB-NZ : group #2
  - OA-ZZ : group #3

Learning Material

- Everything is on GitHub: https://github.com/polito-WA-2026
- Course website
  - Slides
  - Full schedule
  - Links and supplementary material
  - Examples, exercises, labs, exams, …
- Video lectures (screencasts)
  - YouTube - https://www.youtube.com/playlist?list=PLuZyhAOPm9pN6rIqyan1PYJ1iE5pYyUDQ
  - Portale della Didattica (download only)



Web Applications (2025/2026)

Material for the course of *Web Applications* (in English) for the Master Degree in Cybersecurity at Politecnico di Torino, Italy.
Teachers: E. Masala, A. Servetti

Course information

Detailed schedule, exams and *rules*, official syllabus, resources and software, sample text of exams from past edition

Available material and repositories specific to the course

Home: github.com/polito-WA-2026

Lecture recordings (YouTube)

Course materials

Lecture examples

Lab code and solutions

Communications

- We will use **Telegram** for the main communications about the course
  - Among students, with teachers, etc.
  - Announcements and official information, and Q&A (using “topics” in Telegram)
- Feel free to contact the teachers for feedback and questions
  - **questions** of general interest (including exam) must be posted in the group, so that everybody can see the answer. NB: Do not exchange suggestions to solve the exam.
- Link to the Telegram group: https://t.me/+suu_OQRLD6c1MDA0
  - Any nickname is ok, but tell who you are for personal issues (especially in DM)
- Emails can be an **alternative** for slower, more articulated, and private individual communications (also, good to preserve info)

About the Exam

Oral discussion is **NOT** on the day (T_0) of the exam!!!

- The exam consists in an **individual** project development + oral discussion
- **Develop a web application** according to the given functional specification, using the approach/technologies seen during the course
  - React + JavaScript, Node.js + Express, SQLite
  - Different technologies/approaches will NOT be accepted and lead to exam failure, without testing the project. If in doubt, ask the teacher in advance!
- **It is NOT ONLY to develop the web applications, but being able to explain the reason of the implementation choices, tradeoffs and alternatives**
  - Today most AI tools can (partially) solve the assignment automatically, **we expect students being able to explain and reason about the assignment, at the exam**
- Assignment published about 20 days before each official exam date (deadline)
  - Different for each exam date *(details are also in specific instructions on course website)*

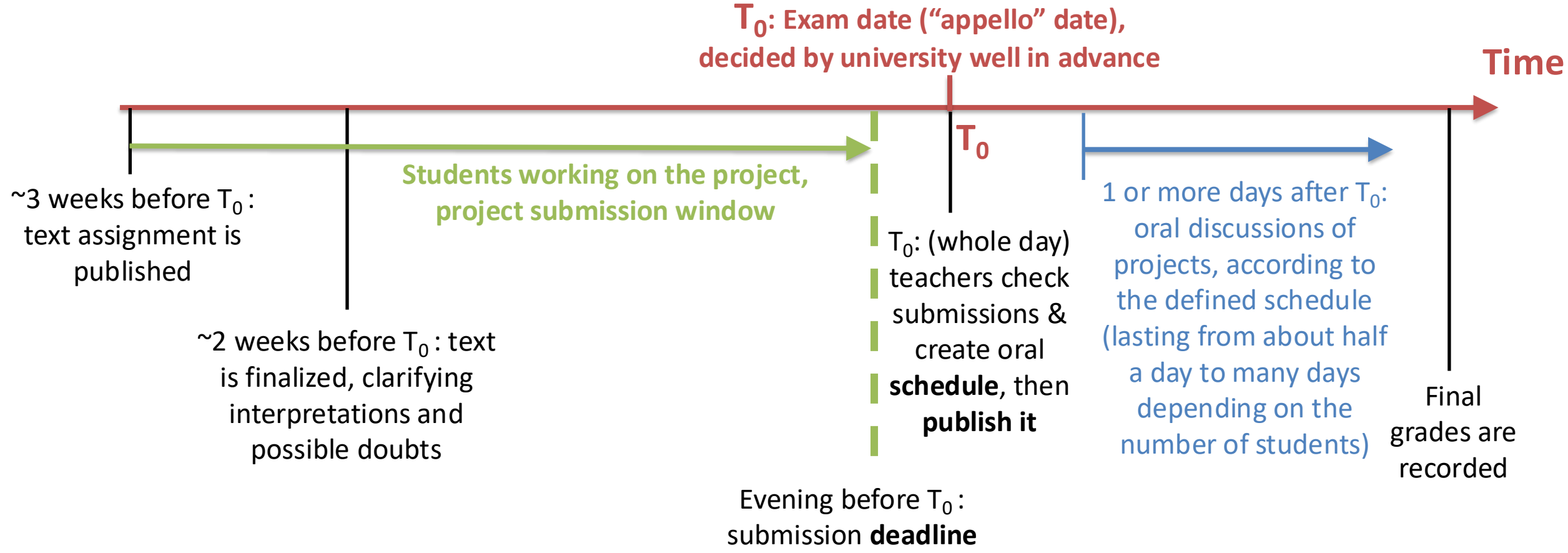
About the Exam: Cheating WARNING

- NOT following the rules lead to exam failures (already happened many times)
  - Regardless of the goodness of the project, even if it is perfect
- Cheating **will NOT be tolerated, in any form, e.g.,**
  - Copying from / developing / submitting for others
  - Using AI tools (ChatGPT/Copilot etc.) without being able to explain the code in DETAIL
- Cases may be directed to Disciplinary Board ("Commissione Disciplina")
  - https://www.polito.it/en/education/services-and-life-at-politecnico/student-conduct
  - Many high-impact consequences, e.g., LOSING scholarships (unfortunately, it already happened…)
  - *Some cases of misconduct (marked with *) will be reported to the authorities (Procura della Repubblica) since they constitute alleged criminal offences

About the Exam: Timeline

Oral discussion is **NOT** on the day (T_0) of the exam!!!

- **For each** official exam date ("appello"):



After Project Submission

Oral discussion is **NOT** on the day (T_0) of the exam!!!

- Similarity checks will be run: excessively similar solutions will lead to exam failure without oral discussion
- A schedule for oral discussions is finalized ON THE FIRST WORKING DAY AFTER THE DEADLINE
  - Depends on the actual number of project submissions
  - The actual day of the oral discussion for a given student is not known until then
- Oral discussion is **NOT** on the day of the exam ("appello" date)!!!
  - Be careful when booking travels etc. If unsure, ask the teacher in advance!
  - All discussion IN PRESENCE (remote is forbidden by university regulations)

After Project Submission

- The teacher will automatically load all solutions on a Linux server
  - Done on the first working day after the deadline
  - This ensure that what is tested is what was submitted
- **STRICT** conformance to submission instruction is extremely important!!
- Check carefully library install and imports, filename upper/lowercase, TCP ports, etc.
  - Wrong settings or need for manual intervention yield some exam grade reduction
- *Complete and detailed exam rules and submission instructions in the course website (under "Exams")*

Oral Discussion

- Exam is an **INDIVIDUAL** ASSIGNMENT.
- Not able to explain any code behavior: immediately leads to **exam FAILURE**
  - In this case, no test of app. Already happened (too) many times in the past

Most common reason of **EXAM FAILURE**:
Suspect of external help because student cannot explain functions not included in lectures (coming from any source: AI tools, Internet, friends, etc.)

  - Anything not seen during lectures is SUSPECT by default
  - It will be **systematically** questioned **IN MUCH DETAIL** before the rest

NO STUDENT WILL PASS WITHOUT BEING ABLE TO EXPLAIN SUSPECT CODE IN DETAIL

Oral Discussion: Expectations

- Discussion of the submitted code / API / solution, in student's presence, running it on a Linux server, while testing their behavior
- The student must be able to explain:
  - The rationale behind the project design and why each functionality has been implemented in a certain way
  - Which checks or actions are in place to make the solution secure against the most common types of attacks
  - Possible **variants** of the solution: **extremely important nowadays that many AI tools (ChatGPT, Copilot, Codex, Cursor, etc.) can automatically "solve" simple assignments**
- NB: It is NOT a presentation of the project given by the student
- All submitted projects will be **pre-screened** for unusual (suspect) programming patterns/functions/libraries/content etc.: oral discussion will start from them

Oral Discussion and Final Grade Criteria

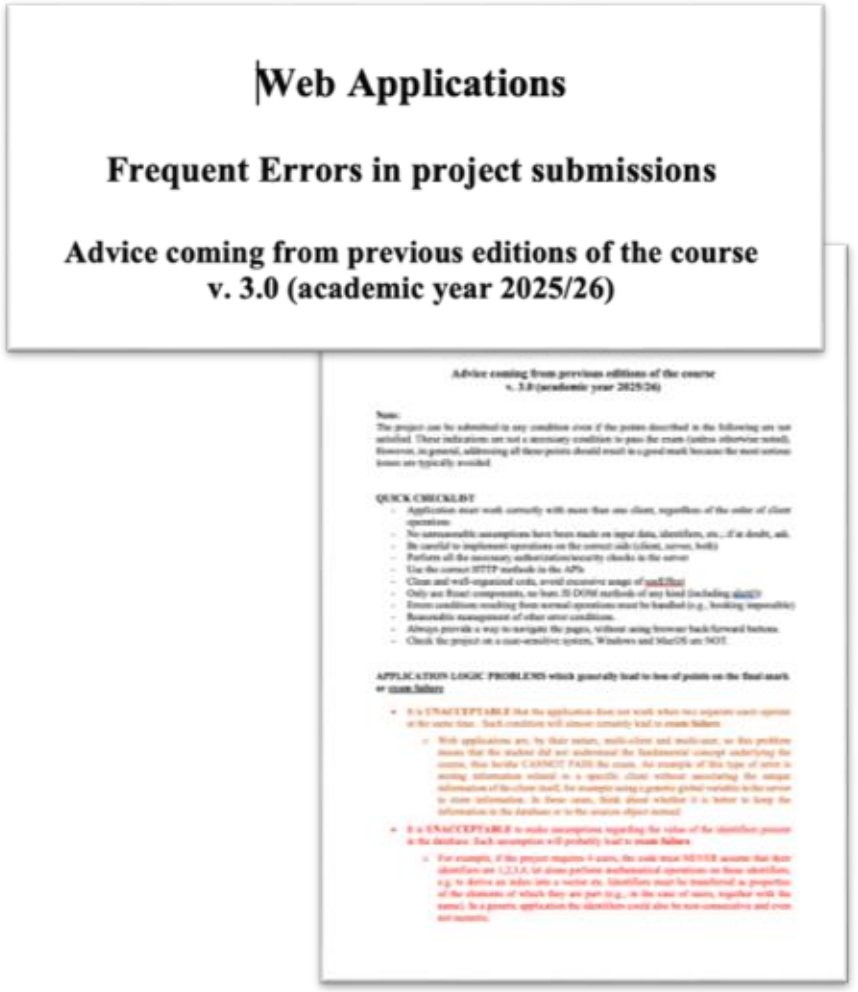
- Provided that the student can correctly explain every choice/part of code:
  - Evaluation of the code (both client and server): programming patterns, **security management and checks**, **data integrity checks**, code clarity, code uniformity and coherence, code placement (server/client), correct usage of React **patterns** (functional behavior, hooks, state, context, effects), etc.
  - Evaluation of the application architecture (e.g., database design and organization, HTTP **API design**, API calls, **content of API requests and responses**, organization of React components and routes, no direct DOM manipulation or browser behavior outside React), **basic usability and user-friendliness**, responses to user actions (UI update, **absence of application crashes** and unhandled exceptions), originality of the solution, etc.
  - Evaluation of the student's theoretical and practical knowledge, readiness and clarity in the replies for questions about:
    - the project design, code base, readiness and clarity in the replies
    - behavior of any function/method (especially/**including** library ones) used in the code and/or seen during lectures

Final Words about AI and Code Development

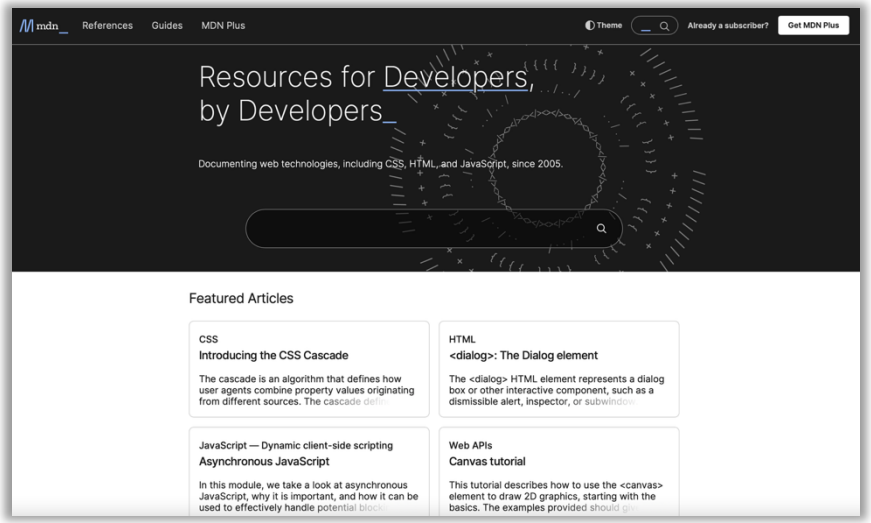
- Many automatic tools can generate code: **ChatGPT, Copilot, …**
- Can inspire small pieces of code, can be confusing in large projects
- **Suggestion: DO NOT USE THEM for the exam, risk of exam failure!**
  - FAILURE at exam is, typically, because the student cannot explain how an (even simple) function/method (suggested or introduced by AI, even if correct …) works
  - Very frustrating for students, since the application is often not even opened
  - You may experiment with AI tools during lectures/lab
  - In lab, we can help you review code and understand advantages/disadvantages/mistakes…
- For the exam: start from your own lab solutions (or our published solutions)
  - Attend (or at least) follow the labs and develop your own solutions!

Suggestions from Past Editions of the Course

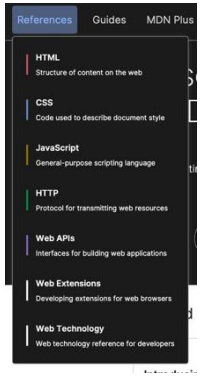
- See the specific document on the course website
- Rather long but (hopefully) full of good advice
  - Quick CHECKLIST at beginning
  - Structured in sections
- Written after listening to hundreds of oral discussions …

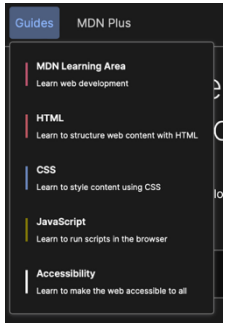


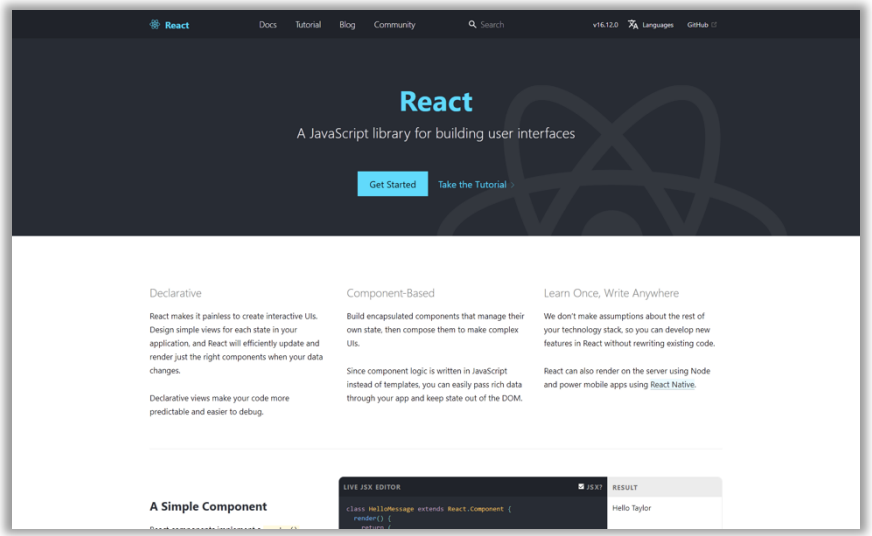
Resources (fundamentals)



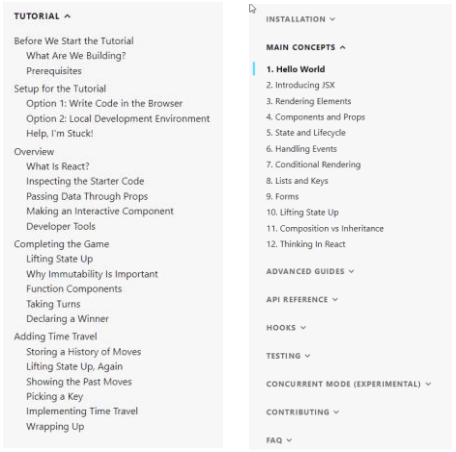
Mozilla Developer Network (**MDN**)
https://developer.mozilla.org/



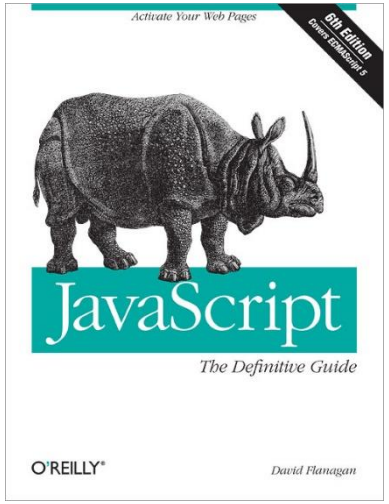




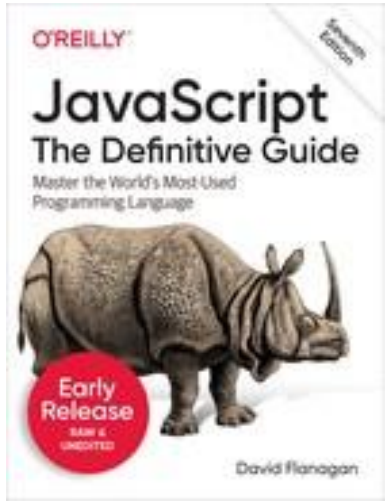
React Library
https://reactjs.org/



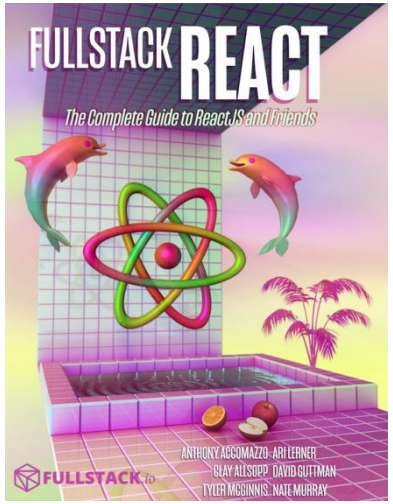
Resources (books)



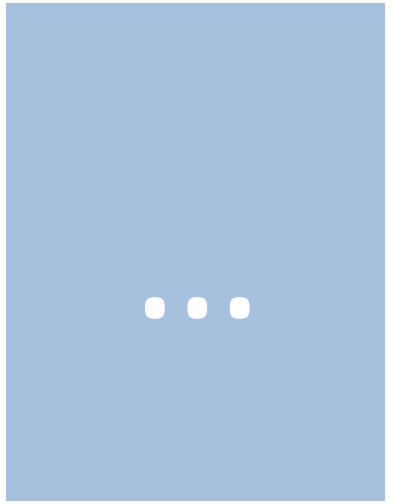
JavaScript: The Definitive Guide, 6th Edition
By David Flanagan
ISBN 978-0596805524
Release Date: May 2011
(not very updated…)



JavaScript: The Definitive Guide, 7th Edition
By David Flanagan
ISBN 978-1491952023
Release Date: July 2020

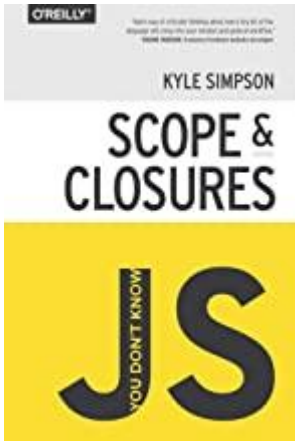


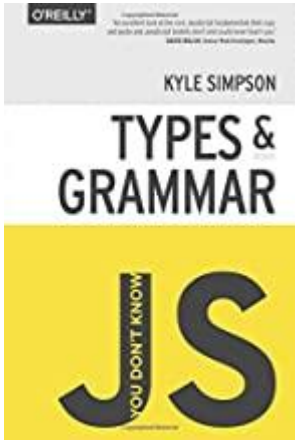
Fullstack React
By Anthony Accomazzo, Nate Murray, Ari Lerner, Clay Allsopp, David Guttman, and Tyler McGinnis
https://www.newline.co/fullstack-react
Release: r40 (January 2020)

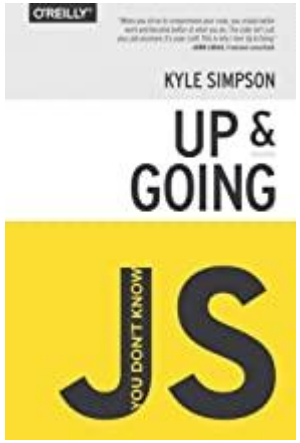


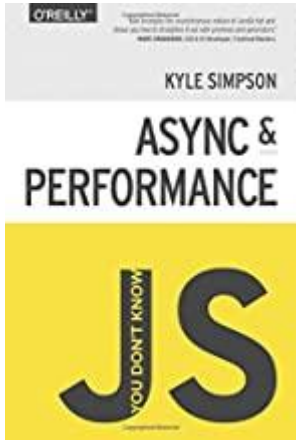
… and many others

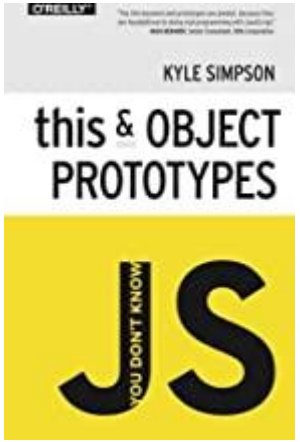
Resources (on-line books)

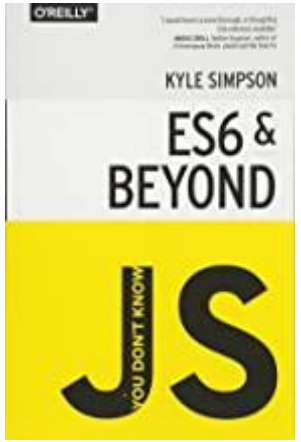




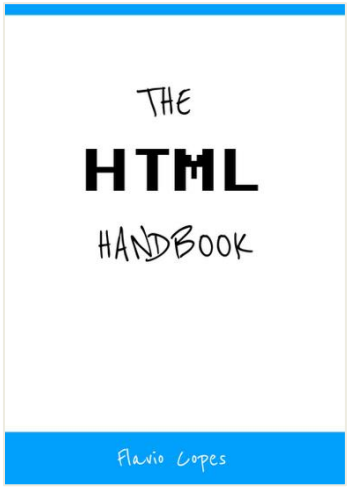






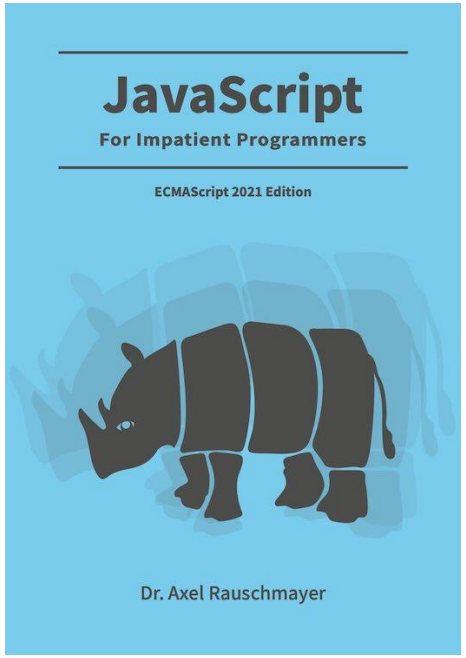


You Don't Know JS Yet (book series) - 2nd Edition
By Kyle Simpson (@getify)
https://github.com/getify/You-Dont-Know-JS



Flavio Copes Handbooks
https://flaviocopes.com/

Resources (on-line books)



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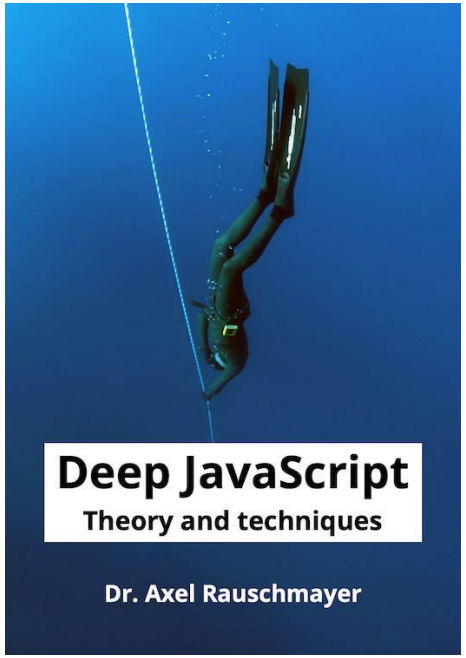
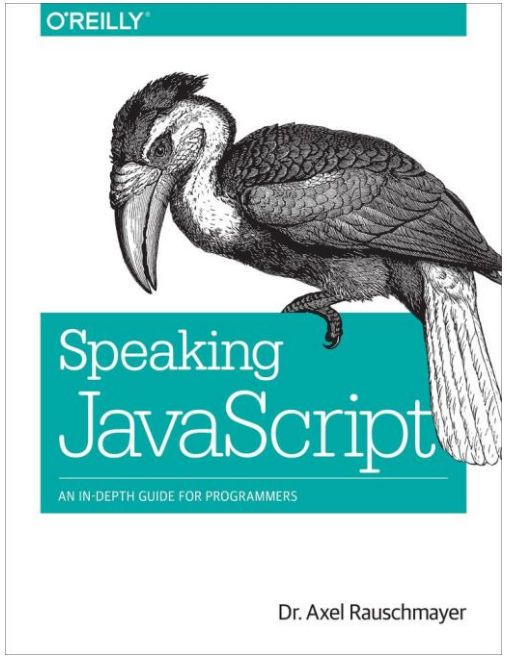


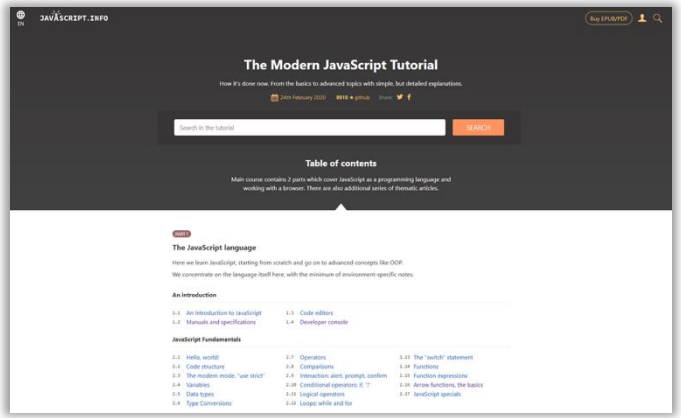


https://exploringjs.com/impatient-js/index.html

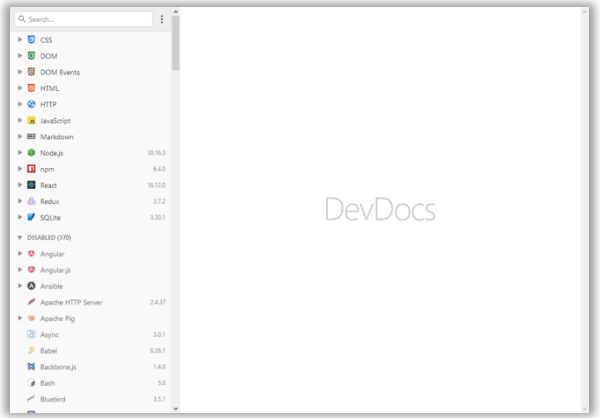
https://exploringjs.com/deep-js/index.html

http://speakingjs.com/

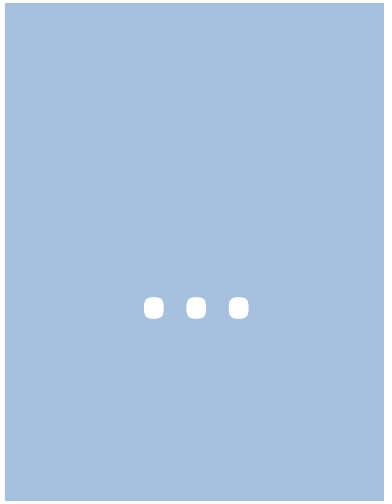
More resources…



The Modern JavaScript Tutorial
https://javascript.info/



DevDocs: API Documentation Browser
https://devdocs.io/



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