Teaching Statement

I know the last true teaching experience in my CV is in 2012, but you can also see from it that I really tried hard to catch up with teaching and research since 2019.

I would say that my main teaching theme is to learn from the available online courses from highly ranked universities and make a mixture that is most suitable to the orientation (and level) of the class I'm supposed to teach.

I took the necessary teaching training courses back then to promote from a teaching assistant to an assistant professor and from assistant professor to associate professor; this includes credit hours system, new trends in teaching, writing to international publications,....etc. There were no "online teaching" courses at that time, but I guess I learned more about that by being an online student for many courses.

I can teach a post graduate **Algorithmic Game Theory** course following Prof Tim Roughgarden 20 lectures videos & notes 2013, maybe skipping some heavy mathematical proofs and adding newer stuff that came up through the years.

As a main philosophy that I've learned through the years, is to get the students attention through a "why" this is important. This could be through practical *real life problems or previous incidents that used the material in this course* (like the use of graph shortest path & min-cut algorithms in World War II Tim Roughgarden mentions in his Algorithms class, a lawsuit case about the fungibility of money Tadje Dyraj mentioned in his crypto class, the reason behind the delayed use of Schnorr signature in Bitcoin he also mentioned in his lectures, imitation game movie for Enigma in Cryptography,....); and could also be through interesting research problems for postgraduate students like the use of graph algorithms in DeFi arbitrage bots, in game theory problems, in deceased organ donation algorithms, and graph coloring in the USA spectrum auction,...etc. I believe these kinds of examples make students feel the importance of what they are studying, and catch their interest in the Introductory minutes of the lecture or sometimes could be a preface to search for before the lecture.

Reading through different attacks on cross-chain protocols, or DeFi in general, I think it would incentivize the students if each 2-3 chose an attack to cover and explain in 5 mins as an assignment (and get more awareness of their impact, and give space to more variety of cases at the same time). Also, I think I will broadcast and encourage their participation in bug bounties.

A lot of what I studied in the last 4 years falls under the Blockchains wide research area with all its subareas. I've self-studied the old Princeton "**Bitcoin & Cryptocurrencies**" course dated 2015, MIT "**Cryptocurrency Engineering & Design**" course 2018, many a16z crypto group videos, and also "**Foundations of Blockchains**" 2021 & 2023 Tim Roughgarden courses which have a kind of different more theoritical orientation. I've also joined many online MOOC courses; the Berkeley "**DeFi**" MOOC course 2021 where I qualified to earn the Ninja Tier NFT badge; their **Zero Knowledge Proofs** course 2023 where I qualified to earn the Legendary Tier & the Blaizer Tier NFTs; I passed Nicosia University **DeFi** & **Introduction to Digital Currencies** 2023 MOOC courses with grades 88.9% and 85.67% respectively; I navigated through their NFT & Metaverses courses but didn't have the chance to officially register yet. So, I believe I can teach alike courses following their steps (not a pure ZKP course, I believe it's too heavy for me to teach alone) and at the same time having a variety of options to adjust the contents and level of details I should choose according to the required orientation and the students levels,... etc. I've learned this also from watching videos for the same professors or scientists explaining the same subject for different audiences.

Also, *being in the student chair for a change helped me get some insights* about the ordering of topics within a course, when you need to be told and understand the whole picture first before delving into the lecture topic, and when it will complicate things and it's better to understand each topic (or point) alone first.

Finally studying such a rapidly advancing topics, emphasized my original convention in handling students questions that is *there's nothing wrong in saying"I don't know"*. If it just slipped out of mind, no problem in saying that I'll refresh my memory about it and answer next lecture (or through discord); while if it's something new to me I believe it's better to say let's all try to read more about it and discuss it next lecture; this also promotes the learning attitude because there will always be something new that they did not study in college and have to learn on their own[1]. Anyways, I think discord and other online discussion boards made this "goes without saying"; you are not obligated to answer promptly.

I started originally from Algorithms Design & Analysis so I can definitely teach it and related courses such as data structures. I also can teach basic under graduate primitive courses like digital design level1 for example (gates, counters), and I've taught Compiler Construction for several years.

I do have a teaching experience on Cryptography, Computer & Network Security, I taught the courses back then from Stallings two books; the ZKP course also have a cryptographic nature. However I honestly do not find myself qualified to teach a complete "Cryptography & Network Security" alone now; a lot has evolved that I'm trying to catch up partially as a necessity of research in the Blockchain area (*and can teach those specific parts within a Blockchain course*), but not to the limit I can teach a pure Cryptography & Network Security course again. However, I may teach parts (as I see different lectures taught by different professors in online international MOOC courses). I can also teach an **e-voting** course, **blockchain consensus** course,…etc as you can see my papers/articles are of an explaining and/or summarizing nature.

Supplementary material:

-You can get an idea about <u>my accent and language</u> of explaining & presenting from the BlockTEA paper: video here: https://youtu.be/7zeiJ91NdYc

-<u>Samples of my old exams:</u>
https://m.facebook.com/story.php/?id=100010333725264&story_fbid=2002137723473999

-Maybe some <u>answers in the Computer Science educators</u> that added me +20,20,20,18,40 points respectively (although about 2 years ago):
https://cseducators.stackexchange.com/questions/7035/do-any-computer-engineering-programs-have-a-required-digital-logic-course-that-c/7040#7040
https://cseducators.stackexchange.com/questions/6127/what-are-some-real-life-applications-of-the-knapsack-problems-class/6330#6330
https://cseducators.stackexchange.com/questions/7044/teaching-algorithmic-thinking-without-a-programming-language/7054#7054

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[1] This was a main philosophy in where I graduated from; I remember professors telling us back in 1994 "we can't promise that you won't be faced with new stuff you didn't study here, even programming languages change with newer ones, but you were prepared with enough basics to study what's new; you should say give me a month to read & practice"

https://cseducators.stackexchange.com/questions/6957/greedy-algorithm-approach/6974#6974
https://cseducators.stackexchange.com/questions/6897/book-to-substitute-compilers-principles-techniques-and-tools-by-ullman-et-a/6976#6976

-Medium articles to examine how do I approach topics with different levels of detail:
https://medium.com/@shymaa.arafat/

-Other explanatory live videos as samples (sorry, the Facebook ones contain some Arabic words but you can get an idea from the slides):
https://youtu.be/ouVeoLg_h4A
 https://youtu.be/fa35Bk3OFww,

https://m.facebook.com/story.php/?id=100010333725264&story_fbid=1409002919454152

-Maybe this one too: https://m.facebook.com/story.php/?id=100010333725264&story_fbid=1018702451817536

I guess that's all, thank you very much for reading...

Sincerely,

Shymaa M Arafat

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