Student Startups. A Problem-Based Learning Strategy to Launch Career-Ready Chemists

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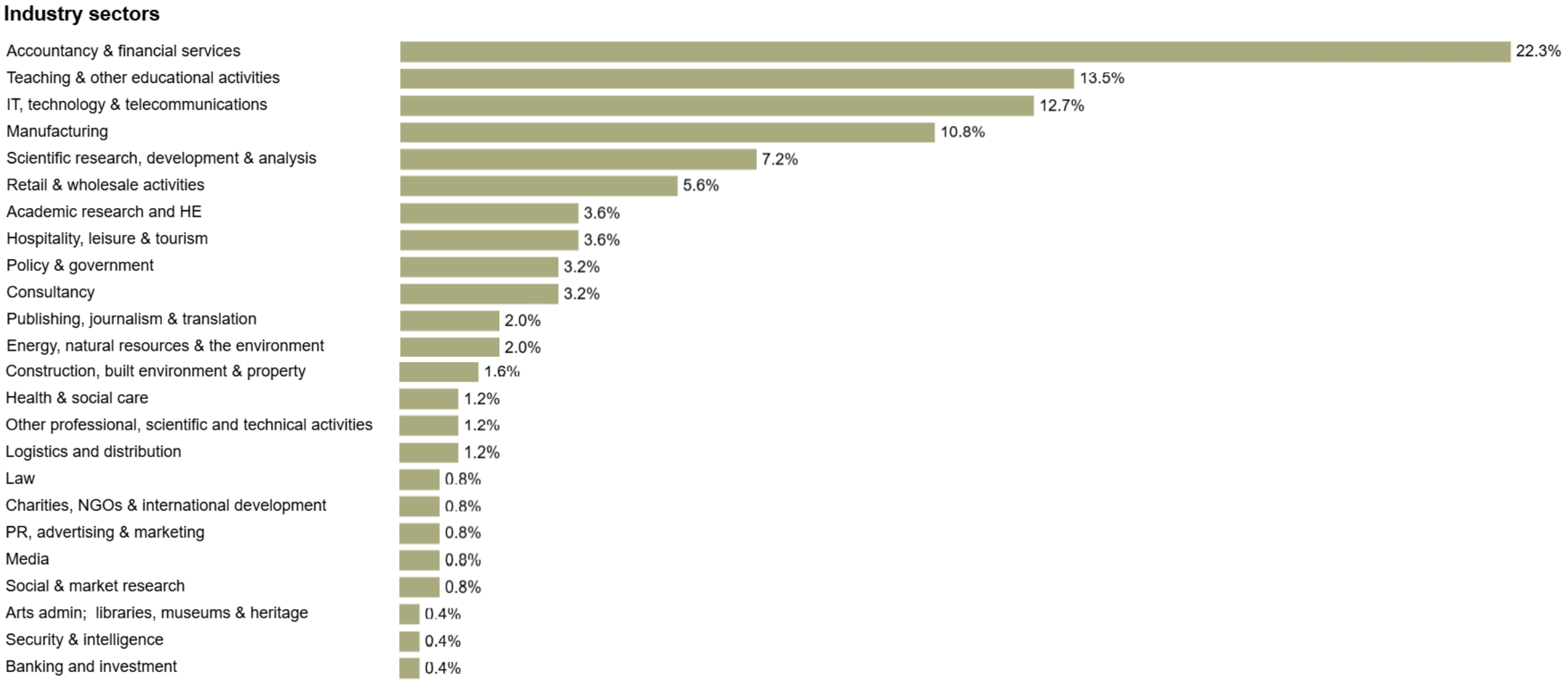
By Katy Coyte. UCL Careers

WHAT DO UCL CHEMISTRY GRADUATES DO? (2024)



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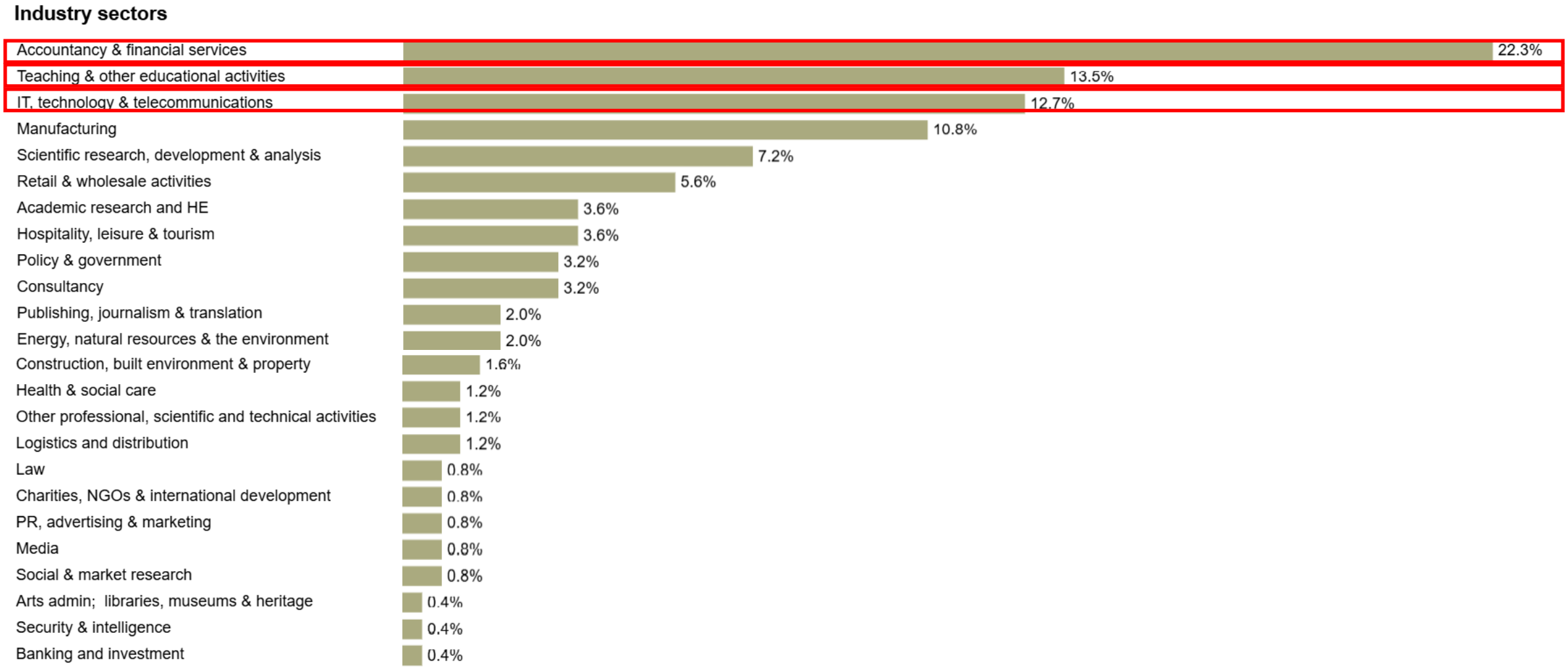

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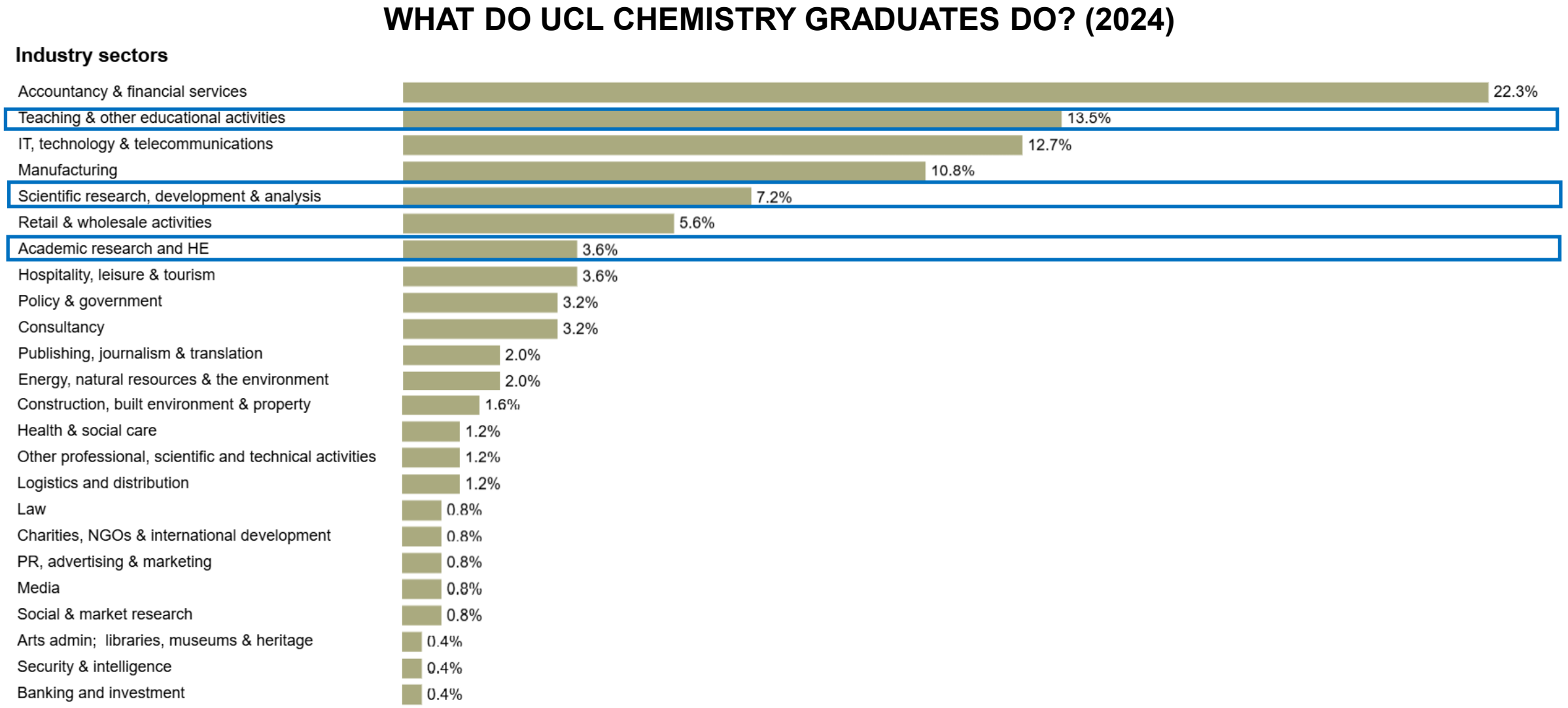

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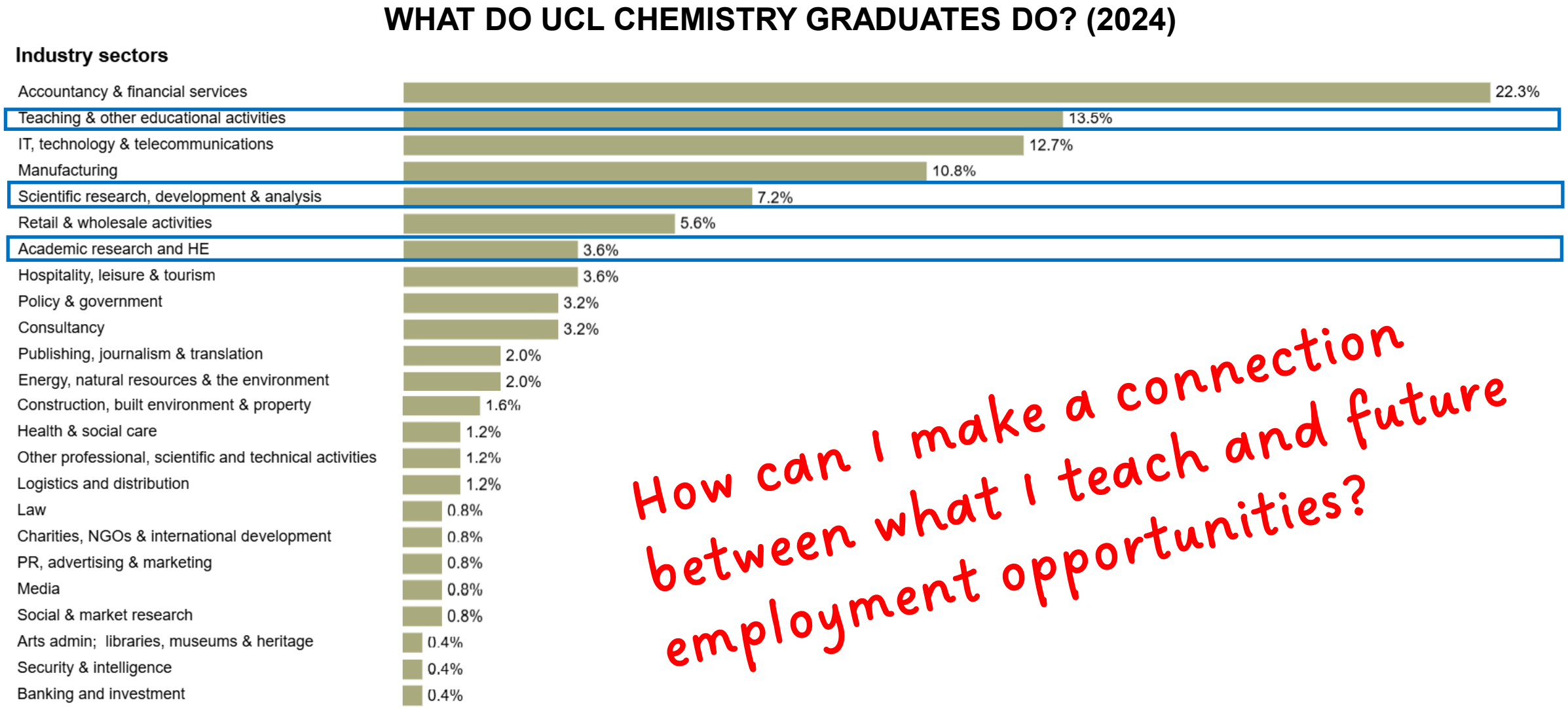


How can I make a connection between what I teach and future employment opportunities?

What is PBL?

Problem-based learning (PBL) is a student-centred approach to learning in which students work to solve open-ended problems in real-life scenarios

- Learning by the investigation, explanation, and resolution of problems, and reflection on the learning experience.
- Students work in collaborative groups
- The teacher is as a mentor and facilitator of the discussions, without interfering with the students' train of though

(Research) Questions

- The question I always get from my students:

  What can I do with my Chemistry degree?

- How does the startup-simulated PBL model impact Chemistry students' awareness of industry-specific roles and career pathways?

Problem-Based Learning Design

Context

- **A real-world scenario in the chemical industry:**
  Production of PET plastics from fossil resources
- **Activity objective:**
  Developing a more sustainable approach

Participants' Roles

Based on real job postings:

CEO, CSO

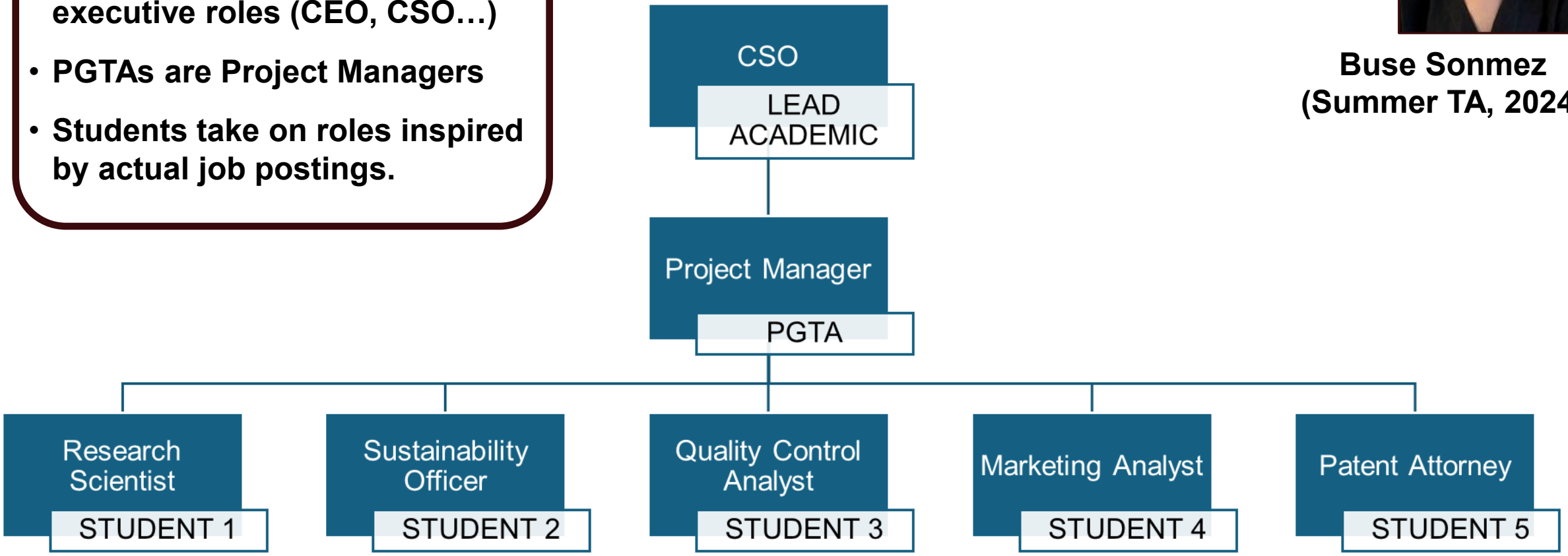
Project Manager

Research Scientist, Sustainability officer, Quality Control analyst, Marketing Analyst, Patent Attorney

Model Startup Roles and Hierarchy

Buse Sonmez
(Summer TA, 2024)

- **Lead academics take on executive roles (CEO, CSO…)**
- **PGTAs are Project Managers**
- **Students take on roles inspired by actual job postings.**



Model Startup Roles and Hierarchy

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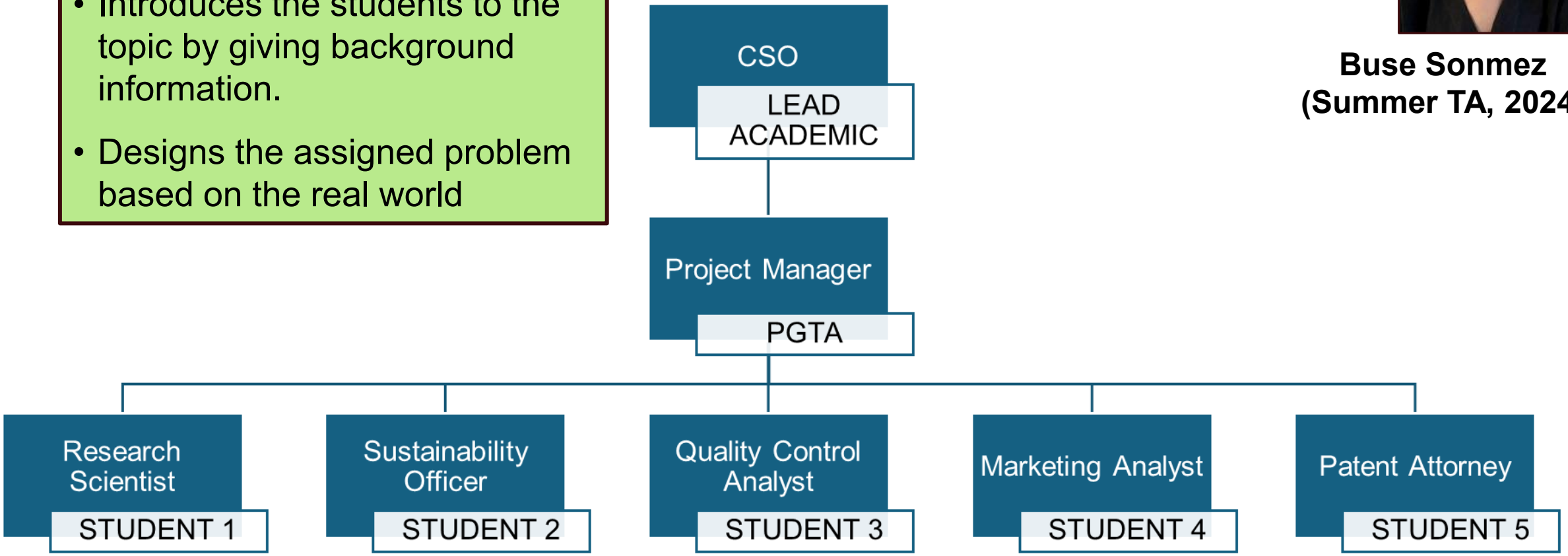
CEO, CSO (Lead Academic)

- Introduces the students to the topic by giving background information.
- Designs the assigned problem based on the real world



Model Startup Roles and Hierarchy

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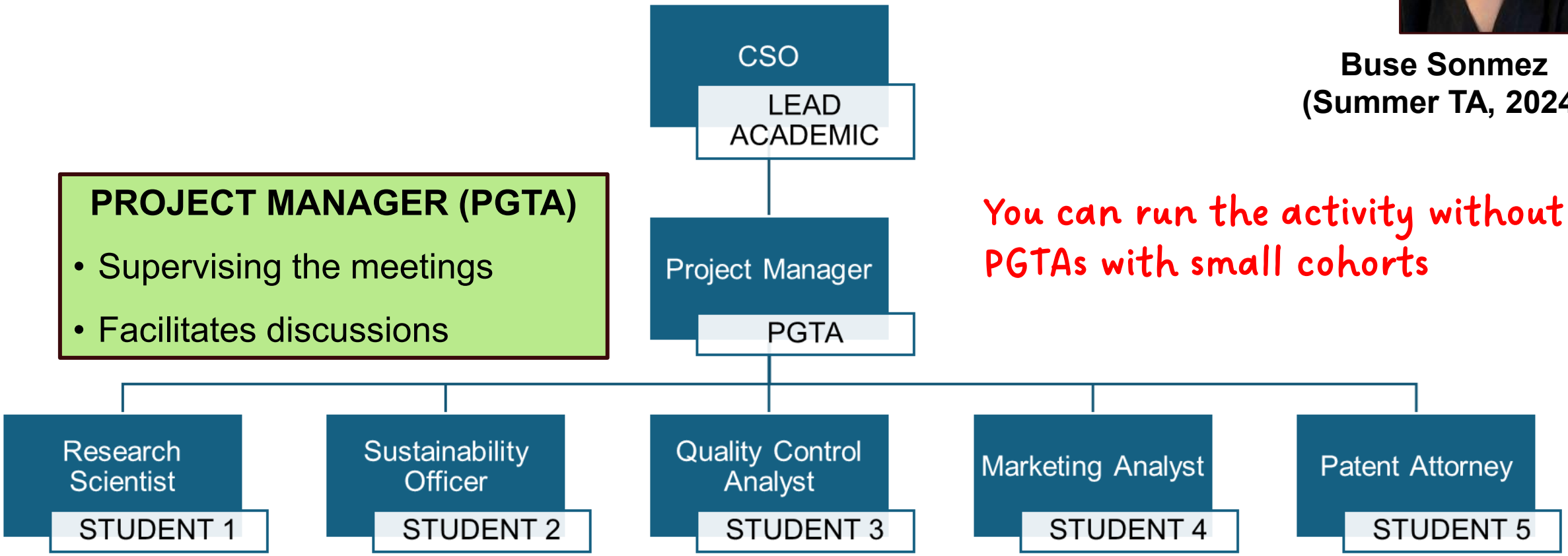
PROJECT MANAGER (PGTA)

- Supervising the meetings
- Facilitates discussions



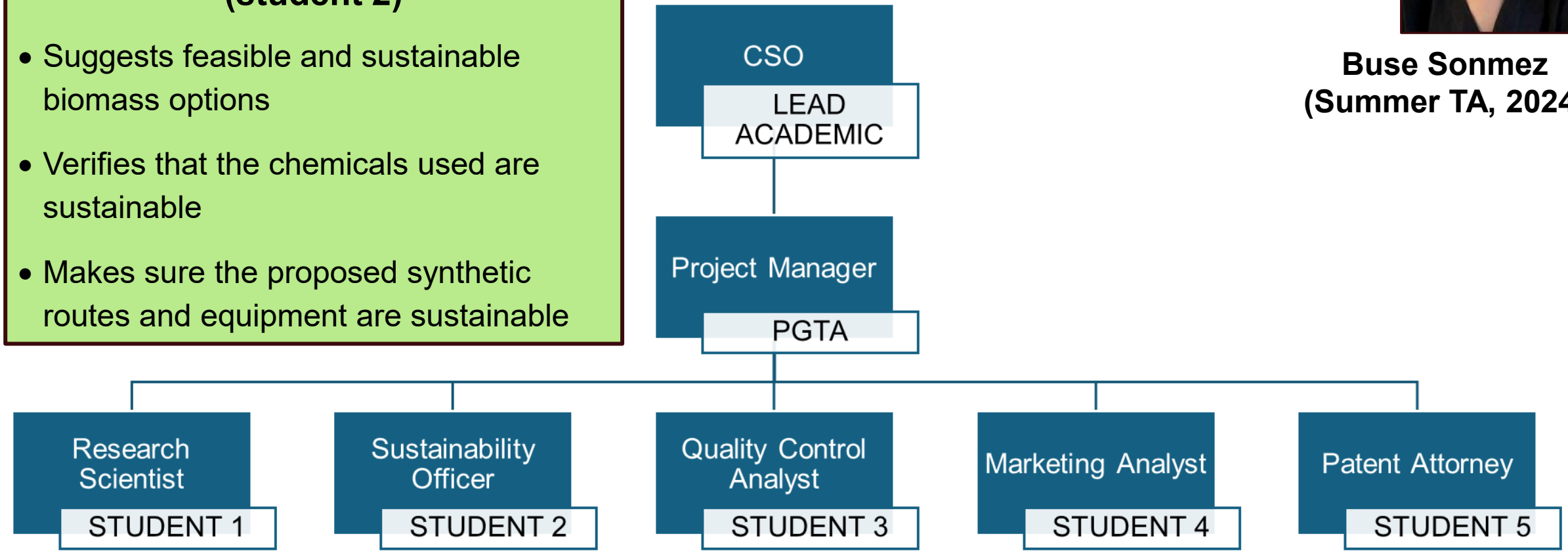
You can run the activity without PGTAs with small cohorts

Model Startup Roles and Hierarchy

Buse Sonmez
(Summer TA, 2024)

SUSTAINABILITY OFFICER (student 2)

- Suggests feasible and sustainable biomass options
- Verifies that the chemicals used are sustainable
- Makes sure the proposed synthetic routes and equipment are sustainable



Model Startup Roles and Hierarchy

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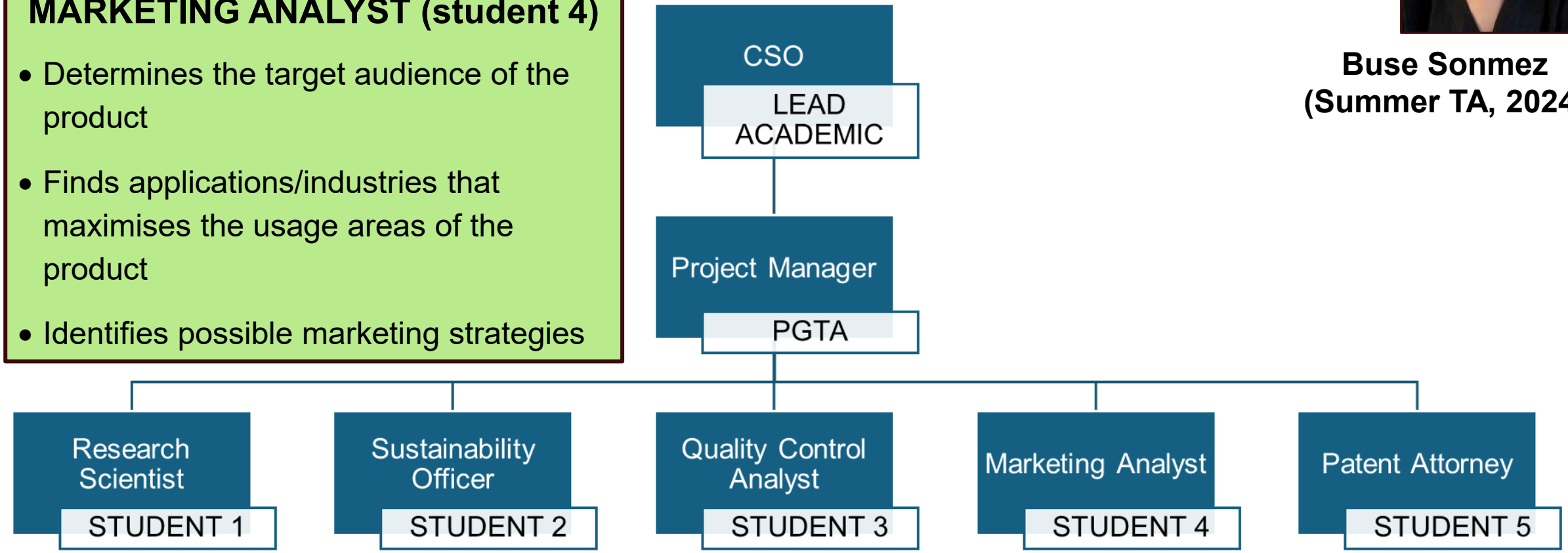
(Summer TA, 2024)

MARKETING ANALYST (student 4)

- Determines the target audience of the product
- Finds applications/industries that maximises the usage areas of the product
- Identifies possible marketing strategies



Model Startup Roles and Hierarchy

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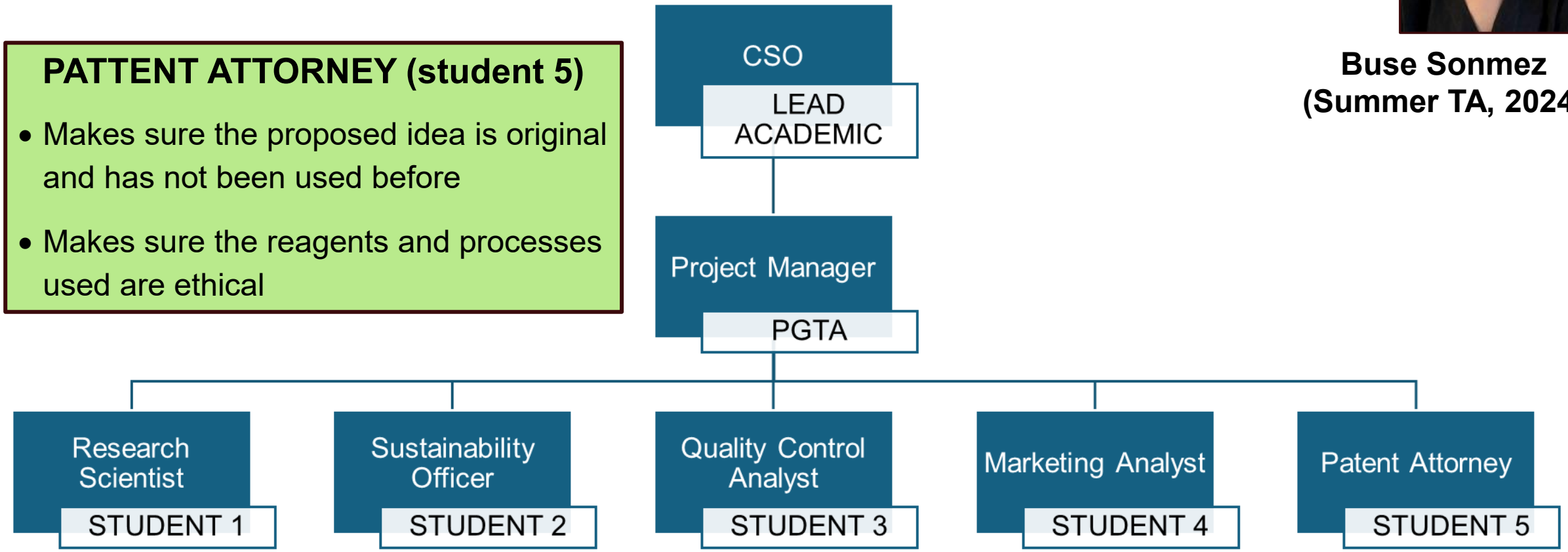
PATTENT ATTORNEY (student 5)

- Makes sure the proposed idea is original and has not been used before
- Makes sure the reagents and processes used are ethical



Timeline and Structure of the Student Startups PBL activity

- Module CHEM0087: Core Concepts in Chemical Sustainability
- 8 international students
- 3 weekly 2-hour worth sets of educational materials (recorded lectures, readings and quizzes)
- Kick off lecture (1h)
- 3 weekly 2-hour workshops (active learning sessions)

WEEK	ACTIVITY	COMMENTS
0	On-line Educational Materials available	The activity is flipped, and the active learning sessions from week 2 are PBL workshops
1	Kick off lecture	• Chiel Scientific Officer (CSO, Lead Academic) introduces real-life industry problem in the context of sustainable chemistry. E.g. Sustainable production of PET • Students form groups (startup companies) and are assigned to a PGTA (Project Manager)
2	Workshop 1. Biomass Pre-treatment	First company meeting overseen by Project Manager to work on workshop 1.
3	Workshop 2. Design of Sustainable Chemical Processes	Second company meeting overseen by Project Manager to work on workshop 2.
4	Workshop 3. Design of Recycling Protocols	Third company meeting overseen by Project Manager to work on workshop 3.
5	Q&A Session	Feedback provided by CSO
6	Submission of Assessment and presentation of results to CSO	Example of Assessments include poster presentation, report submission and oral presentation to a panel of academics (e.g. pitch to a group of “investors”)

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Take-Home Notes

- Preliminary feedback indicates that:
  - The startup-simulated PBL model enhances students' awareness of industry-specific roles and career pathways.
  - Students gain clearer insights into real-world professional environments linked to their academic studies.
  - Students are more confident applying academic knowledge to real-world industry problems.
  - Students appreciate the opportunity to explore and understand diverse career options through role-based learning.

Thanks for your kind attention!

UCL Chemistry Education Research

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