

# Melika Tajipour

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## Personal Statement

Graduate student with expertise in Techno-Economic Analysis (TEA), Life Cycle Assessment (LCA), and Process Simulation, focusing on sustainable synthetic biomaterial production. Skilled in advanced computational tools such as Python, BioSteam, and openLCA, with experience in interdisciplinary collaboration on projects assessing environmental and economic impacts. Dedicated researcher with a passion for addressing environmental challenges through data-driven insights and innovative process development.

## Skills

### TECHNICAL:

Sustainability and Energy Systems: Techno-economic analysis (TEA) and Life cycle assessment (LCA) of synthetic fiber production which involves sensitivity analysis, with a focus on economic and environmental impacts.

Process Simulation: BioSteam environment, OpenLCA, GREET.net, Mathematica, and GREET, Machine Learning : training agents in Mujoco and Gymnasium environments. (Python: PyTorch, Numpy, Matplotlib, Pandas) .

### SOFTWARE AND TOOLS:

Abaqus, OpenLCA, GREET.net, BioSteam, Python, Git.

### PROGRAMMING LANGUAGES:

Python (Numpy, Matplotlib, Pandas, PyTorch), Git.

## Professional Experience

### Graduate Research Assistant

IOWA STATE UNIVERSITY

Ames, IA

May 2023 - Present

- Leading the techno-economic analysis (TEA) and life cycle assessment (LCA) of synthetic spider silk production from E. coli, in collaboration with Washington University, St. Louis, and the Department of Energy Environmental Chemical Engineering. This evaluated the minimum selling price (MSP) of fibers, annual operating costs, and capital costs, while calculating greenhouse gas emissions in the Global Warming Potential (GWP) impact category.
- Developing process simulations in Python and evaluating the environmental impact of synthetic fiber production using openLCA, GREET.net, and Ecoinvent databases. This ensured accurate environmental impact assessments and data-driven decision making.
- Collaborating with cross-disciplinary teams to optimize the economic feasibility and minimize the environmental footprint of synthetic fiber production.
- **Conducting sensitivity analysis** on key factors such as protein expression and fiber yield, identifying the major economic drivers of the process. This provided insights into optimizing production efficiency and cost-effectiveness..

## Teaching Experience

### Fluid Flow Lab - ME 335

IOWA STATE UNIVERSITY

Ames, IA

August 2022 - May 2023

- Supported lab instruction and assessment for courses in fluid flow and mechanical design and Provided academic support to undergraduate students, facilitating their understanding of mechanical engineering principles and lab practices
- Demonstrated exemplary leadership skills by establishing three weekly office hours to provide academic support and address students' inquiries.

### Mechanical Design II

AZAD UNIVERSITY KARAJ BRANCH

Ames, IA

September 2019 - March 2020

- Utilized Abaqus for simulating gearbox components in the Mechanical Design II course .
- Conduct and manage the labs.

## Publications Papers

- [In progress] Evaluating the economic feasibility and environmental impact of synthetic spider silk production from \*E. coli in large scale production\*.
- [In progress] Comparing pioneer and optimized cases of spider silk production in terms of economic viability and environmental impact.

## Education

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### Master of Science Student in Mechanical Engineering

IOWA STATE UNIVERSITY

GPA: 3.60

August 2022 – Present

### Bachelor of Science in Mechanical Engineering

AZAD UNIVERSITY KARAJ BRANCH

GPA: 3.10

September 2017 – May 2022

## Test Scores

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### GRE

VERBAL 154(63RD) – QUANTITATIVE 170(96TH) – ANALYTICAL WRITING 4(54TH)

Overall: 328

November 2021

### TOEFL

SPEAKING 20 – READING 30 – WRITING 30 – LISTENING 30

Overall: 110

October 2021