Capstone Project Inception and Registration Information - Winter 2024

Fill out all the required information according to the instructions . Make sure you specify the details for the 3 parts. Please get your advisor's approval for this document:

* Indicates required question

Skip to question 1Skip to question 1

Project's basic data

1. Title (up to 10 words)

   Gender-Based Biological Pathways Differences in Gene Expression

2. First advisor's full name

Mark only one oval.

- ⬭ Alex Keselman
- ⬭ Anat Dahan
- ⬭ Dan Lemberg
- ⬭ Daniel Bouenos
- ⬭ Dvora Toledano-Kitai
- ⬭ Elena Kleiman
- ⬭ Elena Kramer
- ⬭ Ilya Zeldner
- ⬭ Julia Sheidin
- ⬭ Miri Weiss-Cohen
- ⬭ Moshe Sulami
- ⬭ Nataly Levi
- ⬭ Naomi Unkelos-Shpigel
- ⬭ Renata Avros
- ⬭ Reuven Cohen
- ⬭ Ronen Zilber
- ⬭ Samah Idris
- ⬭ Zakharia Frenkel
- ⬭ Zeev Barzily
- ⬭ Zeev Frenkel
- ⬭ Zeev Volkovich

3. First advisor's email address

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4. Second advisor's full name (if there are two advisors)

Mark only one oval.

⬭ Alex Keselman

⬭ Anat Dahan

⬭ Dan Lemberg

⬭ Daniel Bouenos

⬭ Dvora Toledano-Kitai

⬭ Elena Kleiman

⬭ Elena Kramer

⬭ Ilya Zeldner

⬭ Julia Sheidin

⬭ Miri Weiss-Cohen

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⬭ Ronen Zilber

⬭ Samah Idris

⬭ Zakharia Frenkel

⬭ Zeev Barzily

⬭ Zeev Frenkel

⬭ Zeev Volkovich

5. Second advisor's email address

_____

6. Category

    Mark only one oval.

    ◯ Research

    ◯ Development

7. Explain the project's category in a few sentences (i.e., why it is a
    research/development project).

    The project's category is focused on identifying biological pathways that are differentially
    expressed between genders within various tissues.
    This project falls under the category of research because it aims to uncover fundamental
    differences in gene expression patterns, contributing to a deeper understanding of gender-specific
    biological processes. By analyzing these pathways, we can gain insights into how genetic
    expression varies between males and females across different tissues. This exploration can
    provide valuable insights into gender-specific health issues, contributing to the broader
    understanding of human biology.

8. Keywords (separated by commas)

    Human Genetics
    Machine Learning
    Genomic Data Analysis
    Bioinformatics
    Data Mining
    Genetic algorithms
    Genetic networks

9. Student 1 - ID

10. Student 1 - First name

11. Student 1 - Last name

12.   Student 1 - email address

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13.   Student 2 - ID

_____

14.   Student 2 - First name

_____

15.   Student 2 - Last name

_____

16.   Student 2 - email address

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17.   Link to git Repository

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https://github.com/avtn96/Final-Project.git

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18.   This project is being conducted for an outside company. *

Check all that apply.

☐ No
☐ Yes

Details about the project

19.   General description of the problem

The problem we are exploring is understanding how biological pathways differ in gene expression between genders across various tissues. This involves identifying and analyzing the specific genes and pathways that show differential expression between males and females. By doing so, we aim to uncover fundamental biological differences that could have significant implications for understanding gender-specific traits and conditions.

20.   Planned working process during the first semester (including working phases, tools, algorithms, etc.)

During the first semester, the planned working process will include a comprehensive literature review to define the research problem and formulate the research question. This will be followed by loading and cleaning genomic data to ensure quality for analysis. The WGCNA algorithm will be utilized to construct gene co-expression networks, facilitating the identification of biological pathways. Subsequently, these pathways will be investigated to uncover differences across tissues and genders. Relevant tools and software will be employed throughout the process to ensure robust analysis.

21.   Expected achievements this semester (what are you expecting to achieve at the end of the semester)

By the end of the semester, we expect to achieve a comprehensive literature review, gaining a thorough understanding of what has already been done in the field. The research problem will be clearly defined, along with the methodology for addressing it. Initial data loading will be completed, followed by exploratory data analysis (EDA) to gain preliminary insights. These steps will lay a solid foundation for the subsequent phases of the research, ensuring a well-informed and structured approach to the investigation of genetic differences and biological pathway analysis.