FSE 570 Capstone Project Proposal Rubric

Criteria	Weight	Description	Evaluation Scale
Problem Statement	25%	- Clearly defines a real-world problem. Detail the requirements that must be met to solve the problem. - Explains how this project addresses a data-driven engineering problem and how solving this problem adds value to a relevant stakeholder. - Describes the societal, industry, or research impact of the problem. - Includes the significance of solving the problem in the broader context (e.g., societal, economic, or environmental impact).	1: Vague problem, unclear or irrelevant impact 3: Problem defined, moderate relevance 5: Clear, impactful problem definition
Data Sources	25%	- Use of at least two large, heterogeneous datasets. - Clear description of each dataset's source, structure, and relevance to the project. - Addresses challenges such as data cleaning, preprocessing, or integration. - Includes data accessibility and potential issues in sourcing. - If you're using proprietary data or data with personal identifying information, please demonstrate that you have permission to use this data and show how you'll protect, anonymize, or mask this data.	1: Insufficient or vague data sources 3: Relevant data, moderate clarity 5: Clear, detailed, and well-explained data sources
Methodology	30%	- Application of advanced techniques such as machine learning, regression, Bayesian methods, or neural networks. - Justification for the chosen methods and clear description of workflow. - Clear focus on managing, analyzing, and extracting knowledge from large, heterogeneous datasets. - Explicit application of advanced data science concepts such as machine learning, regression, Bayesian methods, and artificial neural networks. - Identifies the specific data science models and techniques to be used, such as specific algorithms, and how they will be tested and validated. - Clear explanation of model validation methods (e.g., cross-validation, test/train splits).	1: Inappropriate or poorly explained methods 3: Methods chosen but not fully justified or explained 5: Strong, well-justified methods with clear validation steps
Proposal Presentation and Clarity	10%	- Proposal is well-organized and concise, adhering to the 2-page limit. - Clear, concise writing with a logical flow of ideas. - Focuses on essential elements (problem, data, methods) and is free from unnecessary details or excessive elaboration. - Professional formatting and presentation, making it easy to read and understand.	1: Disorganized, unclear, or exceeds the 2-page limit 3: Organized but lacks clarity or conciseness 5: Well-structured, concise, within 2 pages, and highly professional
Project Management	10%	- Timeline and Milestones: Clear and realistic timeline for the entire project with milestones at critical stages. This includes deadlines for data collection, analysis, model development, and draft reporting. - Status Check-ins: Specific goals for what the team expects to accomplish by each status check-in date. - Risk Identification and Management: Identification of the top 2-3 highest risks to the project's success (e.g., data issues, model performance, resource constraints). Describes what metrics or information the team will monitor to assess these risks, how they will track progress, and what strategies or contingencies are in place to mitigate them. - Risk Mitigation: Explanation of proactive steps to manage and address identified risks throughout the project.	1: No clear timeline or milestones, poor risk identification 3: Milestones and risks defined but insufficient monitoring or mitigation plans 5: Clear, detailed timeline, milestones, well-identified risks, and strong strategies for monitoring and mitigation

Heilmeier Questions

At DARPA, the **Heilmeier Catechism** is used to assess and think through every proposed research program. Created by former DARPA director George H. Heilmeier, the catechism consists of nine key questions that researchers and engineers answer to fully understand the context, costs, and effort required to execute a given project.

1. **What are you trying to do?**
2. **Articulate your objectives using absolutely no jargon.**
3. **How is it done today, and what are the limits of current practice?**
4. **What is new in your approach and why do you think it will be successful?**
5. **Who cares? If you are successful, what difference will it make?**
6. **What are the risks?**
7. **How much will it cost?**
8. **How long will it take?**
9. **What are the midterm and final “exams” to check for success?**

Who was George Heilmeier?

George H. Heilmeier, who ran DARPA from 1975-1977, developed this questionnaire based on his extensive career in technology R&D. His early work at RCA is credited with laying the foundation for liquid crystal displays (LCDs). After his tenure at DARPA, he served as an executive at Texas Instruments during a time when the company dominated the home computer market. Heilmeier's legacy continues to influence some of the most innovative research organizations around the world today.