SANTAAA FEEEEEEEEEEEEEEEEE

Jan 10th but do it within Jan 5th

Complexity explorer - <https://www.complexityexplorer.org/courses/159-undergraduate-complexity-research-ucr-application-tutorial>

**Section 1. Complex Systems (max. half page)**

Please briefly discuss what appeals to you about the study of complex systems and/or the research philosophy of the Santa Fe Institute. You can get a brief overview of SFI here: <https://santafe.edu/about/overview>

I have been curious about complex systems ever since I first came across it in my thermodynamics class in high school but the thing that really got me interested and understand its true vast potential was after I finished the “Introduction to complexity” online course from Santa Fe institute’s Complexity explorer. It has long been my wish since to study at this place.

Complex systems are universal found everywhere in the world around us, from biology and ecology to economics and social systems. What really appeals to me is that it is the only course that can give me freedom of study and combine all my interests together from languages to electronics. Understanding these complex systems can help us better understand how the world works and make more informed decisions about how to address challenges and opportunities. This allows for a rich and diverse perspective on the systems being studied and the ability to address problems from multiple angles.

I’ve since decided to become a computer scientist because I love process of computation and the quest for answers. Yet I’ve always known I want to study the laws of nature that govern universe and literature and people, not just the coding. That’s why I want to do research at SFI, because the scientists there want to find the overarching patterns in all the disciplines that fascinate me.

Second, complex systems are often characterized by emergent behaviour, which means that the behaviour of the system as a whole is not necessarily predictable based on the behaviour of its individual parts. This makes studying complex systems challenging, but also very rewarding when we are able to gain insights and make predictions.

The philosophical beauty and appeal of complex systems lies in their ability to capture the complexity and diversity of the world around us. Complex systems are characterized by a large number of interacting parts that can produce emergent behaviour that is not present in the individual parts themselves. This emergent behaviour can be unpredictable, self-organizing, and dynamic, and can lead to complex and diverse outcomes. What better way to describe the life itself.

Another philosophical appeal of complex systems is their ability to model and explain the emergence of order and pattern in the world. Complex systems can exhibit self-organizing behaviour, in which patterns and structures emerge spontaneously from the interactions of the parts. This can help us to understand how complex and ordered systems can arise from seemingly random or chaotic processes.

Overall, the philosophical beauty and appeal of complex systems lies in their ability to capture the complexity, interconnectedness, and diversity of the world around us, and to provide insight into the emergence of order and pattern in the world.

**Section 2. Topics (max. one page).**

Please describe two scientific questions or research projects that interest you as well as your general idea of how you might address these. For both, provide enough background and detail to convey (1) the importance of the question or project or what interests you about it, and (2) the logic of your approach.

Agent-based modeling is a method used to simulate the actions and interactions of autonomous agents, such as individuals or organizations, in a system. Being a computer science major and studying macroeconomics (uncredited), I am keenly interested in studying Chaos Theory and Agent-Based Modeling in Macroeconomic Systems. It’s important to study how small changes in the behavior of individual agents, such as consumers and businesses, can lead to complex and chaotic macroeconomic outcomes in order to predict and prevent economic phenomena such as market crashes, financial crises, and busts.

This study is important for several reasons, including better policy making and improving economic forecasting. We can achieve this by defining the research question and parameters, literature review, extensive data collection, analysation and interpretation. Another important aspect of this study would be the validation of the model through a comparison of simulated and real-world data. This allows to check the robustness and generalizability of the results.

Finally, I would also consider ways to improve the model and make it more realistic, such as by incorporating more variables, increasing the number of agents, or adding more sophisticated decision rules for agents. I am excited about tackling this problem with Interdisciplinary collaboration and effort.

study how small changes in the behavior of individual agents, such as consumers and businesses, can lead to complex and chaotic macroeconomic outcomes. Such models can be used to analyze and predict economic phenomena such as market crashes, financial crises, and booms and busts.

**Section 3. Collaborative Work (max. half page)**

The SFI UCR program requires collaboration. Please describe an experience with collaboration, whether in college or elsewhere, and what you learned from that experience about how to work effectively as part of a team.

During my sophomore year, I took introduction to Entrepreneurship course at **Centre of Innovation and Entrepreneurship lab**. Having, team **I was assigned a team of diverse Backgrounds. Biotechnology. Mechanics. We had nothing in common.**

We had to finish the job coursework, create a website and Business Canva Model.

**We faced the issues and problems of.**

**Resolve conflicts. We tackled the issue head on. Working closely, breaking the tasks to smaller chunks and beginning early. Tools like Figma to create outline and well-defined role. Autonomy. Working towards a common goal, Communication. We finished the task with a week to spare.**

**Freelancing site. Connected. Went on to get 15+ clients. The course finished aced it and I’m pleased to announce that I have been selected as the teaching assistant for the same course mentoring a new batch of 60 students, starting from July, the next academic year.**

**As a sophomore student, I had the opportunity to take the “Introduction to Entrepreneurship” course at the Centre of Innovation and Entrepreneurship lab. While we were near the end of the course, we were all grouped randomly as a team for the final entrepreneurial project to build a freelancing website to help connect student freelancers with small scale clients and provide a concrete business canvas model and supporting research.**

**My group was composed of students from diverse academic backgrounds, such as Electronics, Biotechnology and Mechanics. Being strangers, we initially had difficulty finding common ground. Despite these challenges, we were determined to complete the coursework.**

**Two weeks in and with nearly zero progress, I felt we had to start taking steps. We encountered a number of issues and problems that required us to work closely and communicate effectively in order to resolve them. We used tools like Figma to outline our tasks and define clear roles for each team member, and we made an effort to start early and break the work into smaller chunks to better manage our time. By maintaining autonomy and focusing on our common goal, we were able to overcome any conflicts and complete the project with a week to spare.**

**Our freelancing website ended up attracting over 15 clients, and I was thrilled to receive an A on the course. Furthermore, I was selected as a teaching assistant for the same course in the upcoming academic year.**

**One experience with collaboration that I had in a computer science class was when my group and I were tasked with creating a web application for the “web technologies” course project. We had to work together to come up with ideas, divide the work evenly, and communicate effectively throughout the process.**

**From the start, we made sure to clearly define roles and responsibilities for each member of the team and set clear goals for what we wanted to accomplish. We also made an effort to regularly check in with each other and provide updates on our progress.**

**One of the challenges we faced was that we all had different schedules and commitments, so coordinating meetings and working on the project remotely was sometimes difficult. To overcome this, we made sure to communicate clearly about our availability and used online tools like Google Docs and Slack to stay in touch and keep track of our progress.**

**In the end, our team was able to successfully complete the project and present a cohesive marketing campaign to the class. Through this experience, I learned the importance of effective communication and organization in teamwork. I also learned the value of flexibility and being open to adjusting our plan as needed in order to meet deadlines and achieve our goals, as well as be open to constructive criticism. Overall, I enjoyed the challenge of working as part of a team and gained valuable skills in collaboration that I will be able to apply in future projects.**

**Furthermore, these lessons helped me create strong well-balanced teams and work on over 7+ hackathons last year.**

**Diversity Statement**

**As an Indian international student, I can bring a unique perspective and diverse background to Santa Fe Institute. I have lived and studied in a different state and culture previously, which has helped me develop adaptability, open-mindedness, and cultural sensitivity.**

**Having grew up in south India, my background has helped me in a numerous way. The rich multilingual atmosphere of Bangalore helped me pick up and speak over 6 languages fluently. Also, seeing people work hard with more than half of people working hard to earn 5 dollars per day has made me so and so. All these experiences have so and so and I am committed to promoting diversity and inclusion in all aspects of my work, and I hope to use my own experiences and insights to help break down barriers and encourage understanding and respect among all members of the community.**

**Being a first-generation student, I realise and am grateful for. I believe that diversity and inclusion are crucial for fostering innovation and creativity, and while working as the club head of my university, I am committed to contributing to a welcoming and inclusive environment for all members of the community. I am excited to learn from and collaborate with individuals from different backgrounds, and to use my own experiences to enrich the collective learning and growth of the team.**

**I am committed to promoting diversity and inclusion in all aspects of my work, and I hope to use my own experiences and insights to help break down barriers and encourage understanding and respect among all members of the community.** Thank you for considering my application!

A **circumstance that I feel has been crucial to my experience in the STEM field is being an underrepresented lower caste student in higher education. Starting college as a first-generation student, I realized many of my peers from different backgrounds already had extensive exposure to the STEM field by conducting research and having mentors that are well established in STEM while my family was struggling to meet 2 meals per day on most days and relying on food coupons. However, this did not deter my passion for science. I kept up with research by reading journal articles on topics that interested me and listening to podcasts about research in biology. I continued to pursue this passion by conducting cancer research, becoming a supplemental instructor, and mentoring incoming college students in STEM. Now, I am becoming the mentor I wished I had in high school to help me navigate higher education without having many people in my life to help me. Overall, these experiences inspire me to encourage other underrepresented people in higher education to continue pursuing their goals and to feel like they deserve the achievements they have garnered.**