

# prepworks™



WORK WITH TRUSTED EDUCATION EXPERTS IN  
THE WORLD'S MOST INTERACTIVE EDUCATION PLATFORM

# Contents

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- 03 | About Prepworks
- 04 | Our Education Team
- 12 | Guided Research & Mentorship Program
- 14 | Mentorship Program Success Cases
- 16 | Student Case Studies
- 28 | Program Sessions Outline



*The path to your future success begins here...*



# About Prepworks

prepworks<sup>TM</sup>

**Pairing world class educational programs with cutting-edge educational technology, we provide students with unique mentorship opportunities through an interactive communications platform**



## Why Prepworks

We are a team of highly motivated individuals who provide students with the resources and guidance necessary to achieve success not only in university admissions, but in future university courses and careers.

Our team of over 105+ professors and researchers at top universities paired with our network of hundreds of tutors and our proprietary communications platform ensure our students receive the most expert guidance within the world's most interactive learning technology.

## Our Success



Our students have a 100% record of not only earning acceptance to universities on their chosen list, but also excelling as university students.



We are one of the most trusted brands in university-level education services.



We are one of the world's largest teams of education professionals with over 100 consultants and mentors.



While the mentorship program is only a part of the holistic admissions process to selective universities, students who have worked within our program have gone on to be accepted at elite universities such as Harvard, Princeton, Yale, Oxford, Cambridge, Columbia, Dartmouth, UChicago, Brown, LSE, KCL, Johns Hopkins, UPenn, Swarthmore, Notre Dame, UIUC and NYU.

# Our Education Team



All of our mentors either have years of teaching experience at top universities in the US and UK, or they have years of professional working experience. These individuals can be professors, researchers or lecturers at selective institutions and they all provide valuable insights and customized coaching for our students.

In the course of their work, our mentorship professors have worked towards publishing scores of research papers, been granted fellowships and research grants, hold a top position in global companies, travel across the world to attend invited seminars, and some have even won scientific awards!





# Our Education Team

## Mentorship Professors



### Lecturer, Statistics & Financial Mathematics, MIT

Ph.D., Statistics, University of California

M.Sc., Statistics, Imperial College University of London

A.B. *magna cum laude*, Applied Mathematics, Harvard College

- Lecturer in MIT Mathematics Department on financial mathematics and statistics.
- Associate Professor and Principal Research Scientist at MIT Sloan School of Management.
- Portfolio Manager and Senior Researcher at European hedge fund and registered investment adviser in US equities.
- Registrations: Commodity trading adviser (active) and commodity pool adviser with National Futures Association, investment adviser in Massachusetts (active), Series 3 and Series 65 NASD certifications.



### Professor, Economics & Finance, University of Pennsylvania

Ph.D., Economics, University of Pennsylvania

M.A., Economics & Finance, University of Pennsylvania

- Finance associate professor with Wharton School of Business, UPenn Associate Dean with California State University, Dominguez Hills
- Served as a consultant to the World Bank, UNDP and the Asian Development Bank.
- Earned multiple publications and competitive research grants



### Deputy Head of School, Undergraduate Program Director, Senior Teaching Fellow, Economics, University of Surrey

Ph.D., Economics, London School of Economics

M.A., Economics, University of Chicago

B.A., Economics, University of Chicago

- Deputy Head of Department and Senior Teaching Fellow in the School of Economics at the University of Surrey.
- Also an economics lecturer for MBA students at Surrey Business School.
- First faculty member at the LSE to receive three awards for outstanding teaching
- Earned ninth teaching award in eight years

# Our Education Team

## Mentorship Professors



### Assistant Professor, Computer Science, Brown University

Ph.D., Systems Engineering, University of Washington  
M.S., Information Science, University of Wisconsin  
M.S., Computer Science, Rensselaer Polytechnic Institute

- Faculty member of Rhode Island School of Design.
- Earned multiple awards including MOC, WARF, CPA, OCY and ΦBK.
- Research into effective information science, computer science and visualization tools.



### Research Assistant Professor, Neuroscience, Tufts University

Ph.D, Neuroscience, University of Wisconsin-Madison  
M.D., Neuroscience, University of Wisconsin-Madison  
B.S., Cognitive Science & Philosophy, Hampshire College

- Won several scientific awards including Forbes 30 Under 30 in Science
- Held various research positions including at Columbia University and YHouse Inc.
- Uses information theory and causal analysis to explore the biological basis of consciousness and understand the nature of emergence.



### Postdoctoral Research Associate, Physics, Brown University

Ph.D., Physics, Université de Genève, Switzerland  
Licenciatura en Física (Equivalent to Bachelors plus Masters degree), Physics, Universidade de Santiago de Compostela, Spain

- Referee for Physical Review X, Physical Review Letters, Physics Review B and Physical Review Materials since 2016.
- Won several scientific awards, including Early-Mobility (Swiss National Science Foundation) Fellow at the California Institute of Technology
- Published numerous publications and invited to various presentations in North America and Europe.

# Our Education Team

## Mentorship Professors



### Lecturer, Chemical Engineering, University of Washington

Ph.D., Chemical Engineering, University of Washington.  
M.S., Chemical Engineering, University of Washington  
B.S., Chemical Engineering, University of Utah.

- Chemical Engineering lecturer at University of Washington.
- Integrates engineer and data science — including the DIRECT course series in software engineering and data science.



### Professor, Aerospace Engineering, University of Michigan

Ph.D., Computer Science & Engineering, University of Michigan  
M.S., Computer Science & Engineering University of Michigan  
M.S., Aeronautics & Astronautics, MIT  
B.S., Aeronautics & Astronautics, MIT

- She is also Associate Director of the Robotics Institute.
- Served on the National Academy's Aeronautics and Space Engineering Board, the Institute for Defense Analysis Defense Science Studies Group, and multiple National Academy study committee, most recently on Urban Aerial Mobility (UAM).



### Assistant Professor, Biomedical Engineering, Brown University

Ph.D., Biomedical Engineering cum laude, Politecnico di Milano  
M.Sc., Biomedical Engineering cum laude, Politecnico di Milano  
B.Sc., Biomedical Engineering cum laude, Politecnico di Milano

- She is also secretary of the IEEE Engineering in Medicine and Biology Society – Providence Section, Editorial Board Member of Science Progress (Sage Publishing) and peer review panelist for the American Heart Association Bioengineering-Basic Science (BSc3) group.
- She holds two patents for her work in "Composite material comprising pectin and calcium phosphate and method for its realization" - EU 11749918.6 and US 13/809855.

# Our Education Team

## Mentorship Professors



### **Adjunct Associate Scientist and Professor, Civil Engineering, Johns Hopkins University**

Ph.D. Civil Engineering, Florida Institute of Technology  
Postdoctoral Fellow, Civil Engineering & Epidemiology, Johns Hopkins University  
M.Sc., Structural & Geotechnical Engineering, National University of Córdoba  
B.S., Structural Engineering – Civil Engineering, Universidad Tecnológica Nacional

- He is also the Principal Consultant at CREA Analytics where he provides Risk Science & Engineering consultations.
- A member of the American Wind Energy Association – the national trade association for the U.S. wind industry
- Awarded Innovation Award - Finalist / The World Bank (2016)



### **Research Scientist, Innovation Fellow, Lecturer, Computational Science and Visualization, Harvard University**

PhD., Information Systems and Quantitative Management, University of Belgrade  
PhD., Computer Systems Engineering, Singidunum University  
Professional Graduate, Data Science. Computer and Information Services,  
Harvard University

- Her accomplishments have garnered her an invitation to join the Visual Computing Group at Harvard's John A. Paulson School of Engineering and Applied Sciences (SEAS)
- Proficient in Information Design and Data Visualization, Immersive Visual Analytics, InfoVIS Tools and Technique, Housing Market Modeling, Spatial and Semantic Analysis, Image-based Recognition.



### **Postdoctoral Research Associate, Computational Biology, UC Berkeley and San Francisco**

Ph.D., Biology, University of North Carolina at Chapel Hill  
B.S. Honors, Biochemistry, University of Montreal  
DEC, Health Sciences, Marianopolis College

- He uses computational image analysis, microscopy and genetic approaches to solve fundamental problems in algal photosynthetic efficiency.
- He is a Board Member of the US Future of Research organization and he contributes to the board projects within scientific research societies
- He is also an Early Career Whitman Fellow at the Marine Biological Laboratory at Massachusetts, US.



# Our Education Team

## Mentorship Professors



### **Researcher & Android Engineer, Computer Science, Vanderbilt University, Youngstown State University**

Ph.D., Computer Science, Vanderbilt University

M.Sc., Computer Science, Vanderbilt University

B.Sc., Computer Science, Youngstown State University, Cumma Sum Laude with Honors

- He is a Senior Android Engineer at Drund, a computer software company and an adjunct lecturer in Computer Science at Youngstown State University
- Between 2011 – 2019, he was a researcher at the Institute for Software Integrated Systems at Vanderbilt University.
- His area of specializations include android development, software engineering, data analysis, algorithms, research and development, distributed systems and more.



### **Environment and Society, Senior Lecturer, Brown University**

MSc., Agricultural and Resource Economics , Oregon State University

B.A., Government and Economics, Franklin and Marshall College

- Been involved in research, design, and construction of high performance educational facilities for over 25 years.
- A member of the Steering Committee of the Northeast Sustainable Energy Association RI Chapter, and is a founding member of the NE Campus Sustainability Consortium.
- Awarded Brown University William G. McLaughlin Award for Teaching Excellence in the Social Sciences.



### **Assistant Professor, Classical Studies & Archaeology, University of Michigan**

PhD, Archaeology and the Ancient World, Brown University

BA, Classics and Anthropology, University of Arizona

BFA, Dance, University of Arizona

- An Assistant Professor in Classical Studies, Roman History and Classics.
- She is also a postdoctoral scholar with the Michigan Society of Fellows and a Research Associate with the Kelsey Museum of Archaeology.
- Her research centers on local responses to Roman imperialism in rural and industrial landscapes of the western Mediterranean (primarily Spain, Portugal, and Sardinia).

# Our Education Team

## Mentorship Professors



### Assistant Research Professor, Sociology, Duke University

Ph.D., Sociology, Duke University  
M.A., Sociology, Duke University  
Master of Theology, Duke University  
Master of Divinity, Fresno Pacific Seminary  
B.Sc., Mechanical Engineering, University of Alberta

- Principle Investigator of The Seminary to Early Ministry Study
- His content expertise is in society and religion, including the changing role of religion in North American society and the role of race in religious structures



### Field Director, Archaeology, Columbia University

PhD, Art and Archaeology of the Mediterranean World, University of Pennsylvania  
Degree of Specialization, Classical Archaeology, Genova University  
Vocational Training, Technical Expert For The Archaeological Sector, Bassilichi S.p.A.  
B.A., Classical Studies in Archaeology, University of Pisa

- Field Director for The Excavation Project in Hadrian's Villa (Tivoli, Rome), as part of a study abroad program organized by Columbia University
- More than 17 years of experience as an Archaeologist, and she has written conference papers and conducted conference talks since 2004.



### Assistant Professor, Music Composition, Berklee College of Music

Ph.D. in Music Composition, University of Pennsylvania  
M.A., Music Composition, CUNY Queens College  
A.B., Russian language and literature, Princeton University

- Served on the piano faculty of the Settlement Music School
- Performed in over 20 cities in US and abroad
- Commissioned by the American Composers Forum, San Francisco Choral Artists, and Amuse Singers
- Honors include the Northridge Composition Prize, the Brian M. Israel Prize, and a MacDowell Fellowship



*He was eager to learn, attentive, and also very professional. He was enthusiastic about the process and introduced many ideas and areas to explore himself.*

*-Dr. Hoel, Tufts University*



*He brought optimism and critical thinking to our mentorship sessions. I am happy to provide a strong recommendation of the student to selective universities.*

*-Dr. Kempthorne, MIT*



*I would recommend him to a technical program in a selective university. I have taught the syllabus we used to approximately 400 students over the last ten years. I would place him in the top 5-10% of performers*

*-Dr. Campbell, Brown University*



*As the program continued, she worked faster and more fluently on her songwriting. She was enthusiastic about her writing, and she was able to listen to my suggestions and adapt her writing in reflection*

*-Dr. Aversa, Berklee College of Music*





# Guided Research & Mentorship Program

Work 1-1 with a top university professor/researcher/scholar or business leader!

This program allows students to expand and apply their knowledge of an academic subject in ways not possible within school courses.

Our team includes 75+ professors/scholars/researchers and business leaders from top universities such as Oxford, Cambridge, Yale, and Columbia.

Paired with our state-of-the-art interactive communications and program management platform, students are able to collaborate with mentors in an accessible, convenient and organized remote learning environment that replicates in-person communication.



## Possible Mentorship Plans



### Internship

Work as an assistant or collaborator on one of the mentor's current projects



### Research Project

Work on a new research project decided upon by you or together with your mentor



### Report/Publication

Work with your mentor on the creation of a written report which could become a publication



### Deeper Learning

Learn from your mentor to increase your knowledge set and level of expertise within a

## Program Details



### Program Length

2-month program including weekly video-chat sessions and continuous email communication



### Location

Most Mentorships are conducted remotely so that students and mentors can be located anywhere in the world!



### Session time

Sessions last about 1 hour and are scheduled to fit both your availability and that of your mentor



### Support

Each Mentorship includes 24-hour support from a dedicated program coordinator



*With hard work, students not only complete a research project or written work/publication, but can also earn a letter of recommendation - an influential asset for future admissions or employment goals!*

# Guided Research & Mentorship Program

While the mentorship program is only a part of the holistic admissions process to selective universities, students who have worked within our program have gone on to be accepted at elite universities such as Harvard, Princeton, Yale, Oxford, Cambridge, Columbia, Dartmouth, UChicago, Brown, LSE, KCL, Johns Hopkins, UPenn, Swarthmore, Notre Dame, UIUC and NYU.



## Mentorship Program Sessions

We work with highly accredited professionals who are accomplished in their field of work. Students who are enrolled in our mentorship program will go through a rigorous academic plan outlined by the mentors.

The main topic of the program will be planned according to student's interest and the pace of the sessions will be customized to suit individual student's needs and academic level.

## Requirements/Pre-requisites

Students are expected to have an attitude for learning, be able to commit their time to the program, be punctual for classes and have the willingness to receive constructive feedback.

As it is a 1-on-1 session, each program is fitted to suit each student's academic level. Generally, no academic pre-requisites are needed.

In the section of 'Program Sessions Outline', you will see some examples of our academic plans.

## How does the Mentorship Program help students to succeed?

- Students can request a Letter of Recommendation from the professor at the end of the program
- The Mentorship Program will differentiate student's profile from that of the competitive pool, which put them on better placements in University applications
- Students get to network with distinguished faculty and the program will be an immense learning opportunity
- Students have an early exploration or deeper understanding about specific disciplines and allow them to reflect on their interest and passion on the particular disciplines
- Students gain exposure to the global research activities & trends
- Students will learn the practical implementation of the theoretical concepts taught
- Students will get a taste of the teaching methodology abroad, and familiarize with college-level course, readings, and research methods
- Reassurance to university admissions officers that the student is capable of excelling in a challenging, elite university learning environment
- Student successfully completes an activity that is likely to be highly prioritized on their Common Application Activities List

# Mentorship Program Success Cases

Students who come from different backgrounds have enrolled in our mentorship program and completed them with high satisfaction. After all the hard work and dedication they put into the program, they received strong letters of recommendations from the professors and have later gone on to be accepted by top universities.

## Student: A.Z.



### Professor Background:

Professor of Mechanical Engineering  
Professor of Entrepreneurship

### Professor University:

Carnegie Mellon University  
Brown University

LOR: YES

### Project Type:

Independent project - Guidance on independent robotics project

### Student University Acceptances:

Yale University  
Vanderbilt University  
University of California, Berkeley



## Student: R.B.



### Professor Background:

Professor of Drama

### Professor University:

New York University

LOR: YES

### Project Type:

Deeper learning - research on use of drama to treat mental disorders

### Student University Acceptances:

Dartmouth College  
University of California, Berkeley  
University of California, Los Angeles



## Student: M.C.



### Professor Background:

Professor of Public Health

### Professor University:

Yale University

LOR: YES

### Project Type:

Deeper learning - Policy issues in Chinese and Indian hospitals

### Student University Acceptances:

University of Pennsylvania  
Georgetown University



## Student: C.Z.



### Professor Background:

Professor of Public Health

### Professor University:

Yale University

LOR: YES

### Project Type:

Deeper learning - research on mental health of Asian students

### Student University Acceptances:

University of Chicago



## Student: D.Z.



### Professor Background:

Professor of Applied Mathematics

### Professor University:

Georgia Tech

LOR: Yes

### Project Type:

Deeper learning - using mathematics to solve urban transportation issues

### Student University Acceptances:

Dartmouth College





# Mentorship Program Success Cases

## Student: H.C.



### Professor Background:

Lecturer in Psychology

### Professor University:

Yale University

LOR: YES

### Project Type:

Internship - study on mental health dependent upon physical health

### Student University Acceptances:

Tufts University



## Student: T.S.



### Professor Background:

Professor of Engineering

### Professor University:

Brown University

LOR: YES

### Project Type:

Deeper learning - research on innovation in wireless technology

### Student University Acceptances:

New York University

University of Illinois Urbana Champaign



## Student: C.W.



### Professor Background:

Lecturer in Management Studies

### Professor University:

New York University

LOR: YES

### Project Type:

Independent project - creation of business plan

### Student University Acceptances:

New York University



## Student: N.W.



### Professor Background:

Professor of Entrepreneurship

### Professor University:

Brown University

LOR: YES

### Project Type:

Independent project - creation of business plan

### Student University Acceptances:

University of Massachusetts -

Amherst Drexel University



## Student: L.S.



### Professor Background:

Professor of Education, Equity in Schooling

### Professor University:

Columbia University

LOR: YES

### Project Type:

Deeper learning - history of social justice

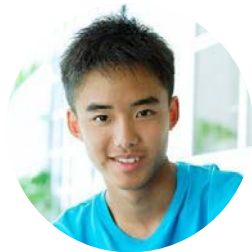
### Student University Acceptances:

Brown University



# Student Case Studies

## Case Studies 1



### **Xavier Wu**

*City of Residence:* Shanghai

*School:* Shanghai American School

*Intended Major:* Electrical & Mechanical Engineering

*Age:* Grade 11

Passionate about swimming

Xavier is very passionate about electrical and mechanical engineering. He has many creative ideas and is very excited to share them. With strong guidance, his ideas have potential to become real design products.

“ He is bright, inquisitive, passionate, and hard-working; He is also a strong technical writer, as evidenced by the content of the design paper and patent application. ”

- Mechanical Engineering Professor, Columbia University

He is an Adjunct Professor of Mechanical Engineering, where he teaches courses in thermal-fluids engineering and aerospace propulsion. He is also an aerospace engineer and manager at a private company in US, where he designs aircraft engine combustors and turbines to meet their durability, performance, and reliability requirements.

### What challenges did he face?

- 1) Xavier has a lot of ideas, however there was a need for him to focus on the main relevant factors contributing to his design paper.

### How did our program help him?

- 1) We helped Xavier reviewed and improved his writing for the design paper.
- 2) Additionally, Xavier learnt to improve his patent application paper for his product design.
- 3) The program has enabled him to write a high caliber design research paper fit for participating in international competitions.

# Student Case Studies

## Case Studies 1

### Student evaluation by the professor

STUDENT EVALUATION

**OVERALL IMPRESSION**  
Briefly describe your interactions with the student. Note any strengths and challenges faced.

is bright, inquisitive, passionate, and hard-working; applied these characteristics to research, invent, and document the wearable sensor system for swim data acquisition and performance analysis.

is also a strong technical writer, as evidenced by the content of the design paper and patent application. Only minor edits were recommended to improve quality of the paper and patent application.

**AREAS OF IMPROVEMENT**  
What can the student do to improve performance in this program?

I recommend that consider reducing the length of future drafts of the design paper.

Please rate your student based on his/her performance in this program so far:

	Unable to Comment	Below Average	Average	Good	Very Good	Excellent	Outstanding
Punctuality						✓	
Homework Completion							✓
Effort							✓
Attitude							✓
Demonstration of Growth						✓	
Potential for Growth							✓
Writing Skills							✓
Reading Skills							✓

Student's final research paper that was later utilized to participate in international design research competition

IASDR 2019

International Association of Societies of  
Design Research Conference 2019  
DESIGN REVOLUTIONS

Manchester School of Art  
Manchester Metropolitan University  
02-05 September 2019

Design and Implementation of Wearable Devices to Enhance Aquatics Physical Education

The digital revolution has enhanced traditional in-class learning through countless hardware and software solutions that allow teachers and students to collaborate more effectively. However, physical education is still taught in the same way as hundreds of years ago, only using "small data" collected by coaches and teachers without technological assistance. This paper examines current solutions to aquatics physical education, proposes a unique wearable device for swimmers, and outlines the design process behind the creation of this device, as well as future steps and intended implementation of this product. The device presented in this paper is capable of gathering and processing biometric and motion data and generating recommendations that can benefit swim training at all competency levels. It combines the benefits of integrated hardware and management software solutions and is cost competitive against similar commercial products

**Keywords:** *aquatics physical education ; machine learning ; artificial intelligence ; big data ; motion analysis; educational equality*

### 2 Research background and competitive product analysis

Wearable devices are any technological device that "can be worn by individuals" and include the "ability to track information related to the individual wearer" (Sandall, 2016). These devices are often used to track the motions of the user and generate real-time feedback. Since 2014, the wearable technology industry has skyrocketed, with newer companies such as Fitbit creating fitness trackers that monitor the users step count, walking distance, and heart rate (Sandall, 2016). More recently, established high-tech companies such as Apple, Samsung, Google, and Huawei have developed smart-wearables that are more powerful with features such as integrated GPS and high-speed cellular connectivity. These devices are beneficial as fitness trackers that encourage users to be more active in their daily lives. They have a few primary purposes: 1) set exercise goals, 2) monitor user's activity, 3) share data with other users.

Some start-up companies are creating advanced products driven by artificial intelligence that use multiple sensors that can "classify which exercise the user is doing" and "correct the user's exercise pattern", two functions conventional fitness trackers cannot perform (Zhang, 2013). These devices are similar to the product functions this paper is outlining. Using accelerometer and gyroscope data, the Microleap2 can detect common issues in running form that can cause injury or inflammation. It then notifies the user in real-time to correct their form. Currently, these devices are limited to running, basketball, golf, and baseball (Mardonova and Choi, 2018).

Recently, companies have incorporated aquatics features into their fitness trackers. However, all of the existing products have fundamental limitations.

For example, the Apple Watch contains an electrocardiogram (ECG) heart rate sensor that is accurate underwater, along with computer algorithms that can detect the type of stroke, and distance swam. Similar to their running functions, these devices fail to provide more specific swimming metrics or provide useful insights on form improvement.

Next, a mobile app and cloud ecosystem will be established. A mobile app will allow coaches to access data in real time via Bluetooth connection with the device. Coaches can use this information to give timely feedback to swimmers. Users can then opt to upload their training data to the cloud where it can be compared to datasets from high-level athletes. All data on the cloud can then be used to train and improve algorithms.

Product	Apple Watch	Smartwatch	Smartwatch	MySwimPro	Smartwatch	Our Service
Type	Hardware	Hardware	Software	Software	Integrated	Integrated
Stroke Detection	N/A	N/A	N/A	N/A	N/A	Accelerometer calibrated with 10 sensors
Stroke Improvement	N/A	N/A	N/A	N/A	N/A	Under Development
Biometric Data	Heart Rate	One type	N/A	N/A	N/A	Heart rate
Training program	Self Generated	N/A	Manual input	Manual input	Self Generated	Self Generated with motion and movement data attached to each training set
Team management	N/A	N/A	Available	Available	Available	Available
Subsquent	6 axis accelerometer, gyroscope and heart rate	One type	N/A	N/A	6 axis accelerometer, gyroscope, compass, barometer, heart rate, and heart rate	6 axis accelerometer, gyroscope, compass, barometer, heart rate, and heart rate
Cost per unit	400 USD (plus 4000 units)	100 USD	N/A (Subscription Service)	N/A (Subscription Service)	200 USD	100 USD (plus 4000 units)
Cost for 10 years (10 units)	8000 USD	2000 USD	1200 USD	120 USD	6000 USD	~3000 USD

Figure 3: Function comparison chart. Source: Author

Figure 11: Sample App Interface. Source: Author.

### 7 Summary

#### 7.1 Current Development

Currently, multiple low fidelity prototypes have been created for beta testing with a few athletes at an international high school in Shanghai, China. Hardware and firmware development is mostly finished with the software capable of outputting all eleven channels of data accurately. Stroke identification software and basic swim metric outputs are complete with software and the stroke improvement package under development.

The latest medium fidelity prototype improves upon the existing form factor, allowing for better usability. First, the total volume of the device was decreased. Second, components were shifted to reduce the clamping force on swimmers' and also remove obstructions present in previous models that prevented swimmers from achieving the best streamline position. Figure 11 shows a side-to-side comparison of the two models.

Figure 11: Medium fidelity prototype (left) and low fidelity prototype (right). Source: Author



# Student Case Studies

## Case Studies 1

### Student's University Acceptance

Xavier has been offered a place at the following universities:



**UChicago  
100% Merit  
Scholarship**



**Caltech**



**UC Davis Regents  
Scholarship USD30K**



**UC San Diego  
Scholarship  
USD5K**



**UC Santa  
Barbara**



**UC Irvine Directors  
Scholarship USD20K**



**UCLA**

# Student Case Studies

## Case Studies 2



### **Alicia Rong**

*City of residence:* Easthampton, Massachusetts

*School:* The Williston Northampton School

*Intended Major:* International Relations / Business

*Age:* Grade 11

After completing the Creative Writing program, Alicia and her family decided to continue working with us on a research paper the following year. With an enhanced level in writing and great interest in business, she is extremely motivated to dive into higher-level research work.

“

*We met regularly and the discussions were excellent. Alicia is a very intelligent, hardworking and conscientious student. Ability to learn quickly and has an excellent attitude and work ethic.*

”

*- Finance Associate Professor, UPenn*

He is currently a finance associate professor with Wharton School of Business, University of Pennsylvania and also an Associate Dean with California State University, Dominguez Hills in the College of Business and Public Policy. Previously he served as a consultant to the World Bank, UNDP and the Asian Development Bank.

### What challenges did she face?

- 1) Alicia had ideas on her research topic but lacked the thought process on writing a high level research paper
- 2) Alicia was taught to do citations for her paper and that is something she would continue to work on

### How did our program help her?

- 1) The professor had the opportunity to discuss Alicia's research topic in depth and stimulated critical thinking in her.
- 2) Alicia was guided throughout the entire process, from the flow of writing to providing sources to support her arguments.

# Student Case Studies

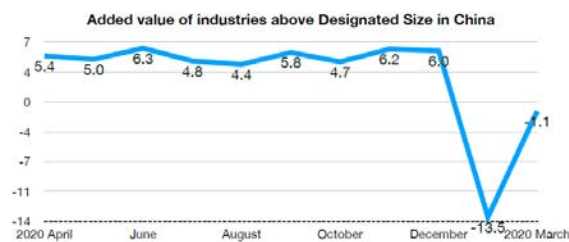
## Case Studies 2

Alicia and her mentor discussed about the impact of COVID-19 on global and China economy with supporting sources



Primary Source: China National Bureau of Statistics

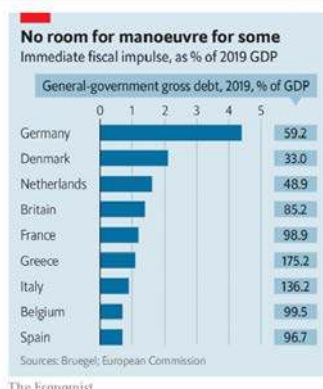
Industries, COVID-19 had the least impact on the Primary Industries. However, agriculture and animal husbandry was still effected by different provinces' travel restriction and African swine fever, which makes it hard for farmers and vendors to sell and circulate their products. In Fenghuang News, an interview of a vegetable vendor from a small town near Wuhan exemplify some dilemmas that people at Primary Industries faced. On January 23, one day before he's going to sell those vegetables to the city, the Wuhan government announced level I major public health emergency - closing the exit channels of all provincial, county and township or even some village roads, and forbidding the passing of all vehicles and personnel. It is very hard for him to go to the field to pick his vegetables, not to even speak of selling those. This is absolutely a huge loss for those farmers, but at least the local



Primary source: China National Bureau of Statistics

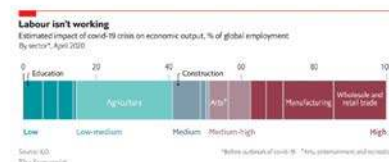
Most of the industrious production in China stopped from January to February, but along with the returning to work on March, industrial output in March narrowed to -1.1% from -13.5% in the previous two months (Source 12). But, because of the spread of COVID-19 all over the world, some orders were canceled instead of increasing. The Third Industries was fell by -5.2%, catering

Importantly, they discussed and analyzed world stock market as well



The stock market is on a downturn while facing the outbreak of the coronavirus. First, it began in the oil market made its way through the global financial system, then it

added concerns on a large amount of the investors about the state of the economy (Source 28). They fell more than half in March, but the oil price provides 90% of Iraq's state revenue. However, the gold price is relatively stable compare with the oil price. It is considered as a safe heaven" for most of the investors, but the price still tumbled briefly in March.



Right after President Donald Trump announced that the US economy maybe facing recession, the Dow Jones Index closed 12.9% down (Source 23). Until March 23, 2020, the US stock market triggers a market wide circuit breaker four times. The travel industry has been badly damaged, with airlines cutting



# Student Case Studies

## Case Studies 2

### Discussion and guidance on financial problem-solving

#### VI. China's measurements on helping low-income groups during COVID-19 period

According to the data from National bureau of statistics, from January to February, retail sales of consumer goods fell by 20.5 per cent year-on-year. Among them, merchandise retail sales fell 17.6 percent, and food and beverage revenue fell 43.1 percent year on year. In the face of considerable decline, it is necessary for governments at all levels to take active measures to boost consumer confidence and promote economic recovery. For helping most of families, and particularly low-income groups, lots of cities announced the issuance of consumption vouchers to the public to encourage and guide residents' consumption and relieve the pressure

#### VII. What are low-income group's remaining needs & possible policies

On early April, India announced \$22.5 billion stimulus package to "be disbursed through food security measures for poor households and through direct cash transfers." Also, South Korea announced cash payments of up to \$186 per household except for the top 30%. In America, the White House announced A \$19bn "food assistance program under the new pandemic". It provides assistance to affected farmers, and distributors, also ensures the safety and stability of the food supply chain.

There are still some families in need did not receive temporary help from the government on time. And there are still a large numbers of vulnerable people above the government's poverty line

### The mentor taught Alicia to write references

27. Weinland, D. (2020, March 16). Chinese economy suffers record blow from coronavirus. Retrieved from <https://www.ft.com/content/318ae26c-6733-11ea-800d-da70cffe4d3>

28. Jones, L., & Brown, D. P. & D. (2020, April 30). Coronavirus: A visual guide to the economic impact. Retrieved from <https://www.bbc.com/news/business-51706225>

29. China Labour Force Participation Rate [1990 - 2020] [Data & Charts]. (1970, January 1). Retrieved from <https://www.ceicdata.com/en/indicator/china/labour-force-participation-rate>

36. L\_204309. (n.d.). 民政部: 为罹患新冠肺炎贫困户发放临时救助金 1000-10000 元. Retrieved from <http://news.hainainet.cn/n/2020/0424/c3541083-31775911.html>

37. U.S. Unemployment Waves Keep Hitting With Millions More Claims. (n.d.). Retrieved from <https://www.bloomberg.com/news/articles/2020-04-23/u-s-jobless-claims-at-1-43-million-in-labor-mut-s-fifth-week>

38. Chatterjee, P. (2020, April 12). The Pandemic Exposes India's Apathy Toward Migrant Workers. Retrieved from <https://www.theatlantic.com/ideas/archive/2020/04/the-pandemic-exposes-indias-two-worlds/609838/>

39. Minimum Wages in China 2020: A Complete Guide. (2020, April 29). Retrieved from <https://www.china-briefing.com/news/minimum-wages-china-2020/>

### The mentor expressed he will be happy to write a letter of recommendation for Alicia

#### Based on your knowledge of this student, would you recommend this student to selective universities? Why or why not?

Yes. Because of all of the positives that I mentioned above. The Selections committees look for the qualities that [redacted] has demonstrated in this mentorship research program.

### Additional positive feedback from the mentor

#### What would you have changed about this program?

COVID-19 made logistics difficult (travel to China for student) but that was unavoidable

#### What can the student do to improve performance in this program?

The student has a good attitude and ability towards research – later on especially in College can learn to read original peer-reviewed journal articles and get even more deeply involved in research and writing.

# Student Case Studies

## Case Studies 3



**Nadia Krishnasamy**

*City of residence:* India

*Intended Major:* Mathematics

*Age:* Grade 11

Nadia has good knowledge of Python programming language and is able to make use of this skill to further her mathematical endeavor in data analytics.

“*She is extremely bright, focused and effective in her research work. Her organization of research results and analyses is excellent. She demonstrated a highly professional, mature and positive attitude about her research work during the program. She is a delightful person with whom I enjoyed every meeting.*”

*- Lecturer, Statistics and Financial Mathematics, MIT*

He is a lecturer teaching Statistics and Financial Mathematics. He has been providing consulting services in financial and statistical analytics to a wide range of institutions through his company, Kempthorne Analytics, Inc. Some of his past clients include Citibank, Colonial/Liberty Funds, American Express and Canon. Since 1995, he has been an investment manager, exploiting advanced statistical analytics to manage a variety of investment programs.

### What challenges did she face?

- 1) She has good knowledge in Python but needed a robust research to put into her portfolio.

### How did our program help her?

- 1) The mentor provided guidance on implementing Python and R together to specify time series models, which allowed the student to compute standard errors of coefficient estimates and permit computation of p-values.
- 2) She was able to analyze time series stock exchange and gained a deeper understanding into ARIMA models.

# Student Case Studies

## Case Studies 3

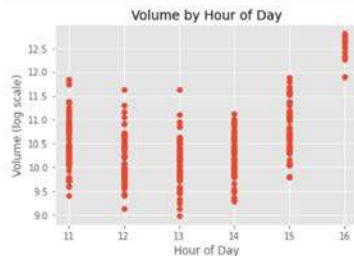
Libraries used for data analysis and graphs plotting

```
In [ ]: import bs4 as bs
import requests
import csv
import pandas as pd
import datetime as dt
import matplotlib.pyplot as plt
import numpy as np
from numpy import log
import pandas_datareader.data as data
from alpha_vantage.timeseries import TimeSeries
from statsmodels.tsa.stattools import acf, pacf
import statsmodels.tsa.stattools as ts
from statsmodels.tsa.arima_model import ARIMA
from statsmodels.graphics.tsaplots import plot_acf, plot_pacf
from statsmodels.tsa.stattools import adfuller
import matplotlib.pyplot as plt
```

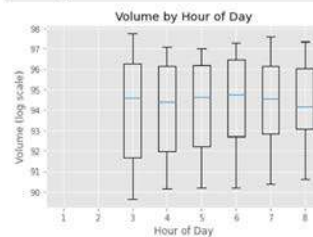
An excerpt of the codes created by the student

```
In [ ]: df['hour'] = df['Date_time'].dt.hour
df['vol'] = np.log(df['S. volume'])
```

```
In [ ]: plt.scatter(df['hour'], df['vol'])
plt.xlabel('Hour of Day')
plt.ylabel('Volume (log scale)')
plt.title('Volume by Hour of Day')
plt.show()
```



```
In [ ]: fig = plt.figure(figsize=(6, 4))
vol_9 = df.loc[df['hour']== 9, 'close']
vol_10 = df.loc[df['hour']== 10, 'close']
vol_11 = df.loc[df['hour']== 11, 'close']
vol_12 = df.loc[df['hour']== 12, 'close']
vol_13 = df.loc[df['hour']== 13, 'close']
vol_14 = df.loc[df['hour']== 14, 'close']
vol_15 = df.loc[df['hour']== 15, 'close']
vol_16 = df.loc[df['hour']== 16, 'close']
volume_all = [vol_9, vol_10, vol_11, vol_12, vol_13, vol_14, vol_15, vol_16]
plt.boxplot(volume_all)
plt.xlabel('Hour of Day')
plt.ylabel('Volume (log scale)')
plt.title('Volume by Hour of Day')
plt.show()
```



```
In [ ]: ## Differentiating close value
df_close_log_diff = df_close_log['close']-df_close_log['close'].shift()
df_close_log_diff = df_close_log_diff.dropna()

### Performing Augmented Dickey-Fuller test for stationarity
print('Results of Augmented Dickey-Fuller Test:')
dfctest = adfuller(df_close_log_diff)
dfctest = pd.Series(dfctest[0:4], index=['Test Statistic', 'p-value', '#Lags Used', 'Number of Observations Used'])
for key,value in dfctest[4].items():
    dfctest['Critical Value (%s) %key'] = value
print(dfctest)

if (dfctest[0] < dfctest[5]):
    print("Time Series is Stationary")
else:
    print("Time Series is Non-Stationary")
```

```
Results of Augmented Dickey-Fuller Test:
Test Statistic      -1.789178e+01
p-value             2.975781e-30
#Lags Used          0.000000e+00
Number of Observations Used  3.080000e+02
Critical Value (1%)  -3.451761e+00
Critical Value (5%)  -2.870970e+00
Critical Value (10%) -2.571794e+00
dtype: float64
Time Series is Stationary
```



# Student Case Studies

## Case Studies 3

An excerpt of the codes created by the student

```
In [ ]: print(results_AR.summary())
```

ARIMA Model Results						
Dep. Variable:	D.Close	No. Observations:	19			
Model:	ARIMA(1, 1, 0)	Log Likelihood	96.468			
Method:	css-mle	S.D. of innovations	0.001			
Date:	Fri, 20 Jul 2020	AIC	196.746			
Time:	15:49:45	BIC	-163.903			
Sample:	01/12/2000	HQIC	196.277			
	- 07-17-2020					
	coef	std err	z	P> z	[0.025	0.975]
const	-7.112e-05	0.000	-0.336	0.741	-0.000	0.000
ar.L1.D.Close	0.6124	0.161	3.803	0.000	0.306	0.919
Roots						
	Real	Imaginary	Modulus	Frequency		
AR.1	-1.5329	+0.0000j	1.5329	0.5000		

Comparative analysis of all 5 stocks

```
In [ ]: from alpha_vantage.timeseries import TimeSeries
import matplotlib.pyplot as plt

for i in range(len(top_5sp500)):

    ts = TimeSeries(key = 'ERA06C236HQVJWZY', output_format='pandas')
    data,meta_data = ts.get_intraday(symbol = top_5sp500[i],interval = '5min',outputsize='full')
    df = pd.DataFrame(data)

    df['Date_time'] = pd.to_datetime(df.index)

    ## filtering data points between the time range of 9.30 AM and 4.00 PM
    df = df[df['Date_time'].dt.strftime('%H:%M:%S').between('11:00:00','16:00:00')]

    ## Selecting Specific time interval
    mins=[0,10,20,30,40,50]
    df = df.loc[df.index.minute.isin(mins)]
```

The mentor will be happy to write a letter of recommendation for the student

**Based on your knowledge of this student, would you recommend this student to selective universities? Why or why not?**

For the reasons above, I am very happy to recommend Narmada to selective universities.

Student Testimonial

Also sharing my mentorship experience with Dr. [REDACTED].

I want to take the opportunity to thank Dr. [REDACTED] for guiding me through the Intraday Stock Price Forecast project. I truly appreciate and value everything I have learnt from him. Since I have never worked extensively on time series data before, this project was quite challenging for me, but Dr. [REDACTED] made it very approachable. With his expertise and profound knowledge, he guided me with the right approaches and techniques towards solving this problem statement. He is an excellent mentor and would like to thank him for his patience in explaining concepts and for those extra sessions he gave me. I have learnt so much from his insights on solving this time series problem. The knowledge he imparted upon me would be a great asset in my future opportunities.

I would like to thank you Danielle for all your support and help in successfully completing this mentorship program.

Thanking you,

# Student Case Studies

## Case Studies 4



### **Samvel Kulkarni**

*Residency:* Bengaluru, India

*School:* Greenwood High ICSE Campus  
Sarjapur Road

*Intended Major:* Computer Science

*Age:* Grade 10

Samvel is extremely passionate about Computer Science. He has participated in various related competitions such as Hackathons and Robocup Robotics Competition 2018. He also enjoys creating personal and business websites, one of which had raised 32,000Rs combined for charity purposes.

“ Samvel and I took advantage of our generational differences and cultural differences to make diversity a strength in cooperative coding. I really enjoyed seeing that in action. He is an intelligent student with a great amount of sincerity and dedication to his work. ”

- Dr. Campbell, Brown University



Dr. Bruce Campbell is a Computer Science Research Assistant Professor at Brown University and an information and computer science project director, who has won several scientific awards. He does research into effective information science, computer science and visualization tools to support collaborative group processes for science and industry.

### What challenges did he face?

- 1) With certain foundation in computer science, Samvel would like to deep-dive into aspects of machine learning and learn advanced coding skills.
- 2) Samvel had to overcome the limitations brought on by the newness of BCI (Brain-Computer Interface) application development.

### How did our program help him?

- 1) The program has proved to provide a new learning ground for Samvel, who learnt to use python and Jupyter notebook to reach his research goals and also to understand components of data visualization and applying to his datasets.
- 2) The program was able to challenge him sufficiently and to work with a qualified professor on a research which he has been interested in for a long time.

# Student Case Studies

## Case Studies 4

### Summary of learning objectives outlined by Dr. Campbell

The first half of the program focused on:

- determining an appropriate project to focus on while investigating programming and code.
- deciding to build a brain-computer-interface (BCI) simulator via a Python notebook finding an appropriate example of EEG data to be the input to the brain control logic.
- agreeing to work to match the best brain output results to the character generation code, created in the past with Samarth's data glove module.
- interactively sharing tasks, results, and iterations on the notebook to learn together.
- reaching an impressive half-way result that is demonstrative of what we can accomplish in eight weeks.

#### Program Overall Structure/Course load:

\_\_\_\_\_ was tasked with creating a Python notebook that could read and analyze raw EEG brain wave output files and find events, patterns, and trends in the data in order to facilitate use in a Brain-Computer Interface system. \_\_\_\_\_ created a simulator for BCI services that could create individual letters from brainwaves for use in applications. \_\_\_\_\_ then created a machine learning approach for performing the analysis.

#### Goals of Program & Learning Objectives:

\_\_\_\_\_ was encouraged to learn as much as he could about the state of Brain-Computer Interface technology and then cooperate in weekly discussions regarding development of services related to BCI applications. Those services were then designed and implemented within a Python notebook that was iterated upon for seven weeks of mentoring sessions.

### Weekly schedule outlined by Dr. Campbell to ensure Samvel is on track and reach his goal in this program

#### Work is to progress this week as follows:

1. Bruce will provide detrending and normalization code for the existing raw datatype (to compare with \_\_\_\_\_'s work on CSV data files).
2. Bruce will work on improving the sensor plots so we can see the placement of each label clearly
3. \_\_\_\_\_ will begin to weight multiple sensor brainwaves to use them in combination when looking for patterns
4. \_\_\_\_\_ will consider making the code flexible in anticipation of individual user calibration
5. Bruce and \_\_\_\_\_ will work further on event-detection code that Bruce introduced so we pursue patterns of events
6. \_\_\_\_\_ is encouraged to send any questions to Bruce by e-mail throughout the week.

#### Work is to progress this week as follows:

1. Bruce will add channel labels to the ELP sensor location plots we reviewed together
2. Bruce and \_\_\_\_\_ will work further on event-detection code that Bruce introduced
3. \_\_\_\_\_ and Bruce will further expand and refine the pattern detection code that searches for maximum correlation coefficients per channel.
4. \_\_\_\_\_ and Bruce will plot the highly correlated lag segments to be able to visually inspect by comparison.

If we finish early, we can also look at doing a pattern and trend analysis of found events.

\_\_\_\_\_ can consider other available data sets and perhaps get data from .SMA files into a format Python can read (but only as low priority compared to other tasks), but this is low priority compared to the work we have set out to do for the week.



# Student Case Studies

## Case Studies 4

Testimonial from Dr. Campbell indicating how much he enjoyed working with the students and how mentorship can prove to be life-changing for any students

From: Campbell, Bruce <[redacted]>  
Date: Fri, May 22, 2020 at 9:56 PM  
Subject: Re: [redacted] Midpoint Evaluation  
To: Danielle <[redacted]>  
Cc: David Schuessler <[redacted]>

Hi Danielle and David,

I am impressed with how well the two mentees you have provided align with my skills and interests to mentor. I submit this midpoint evaluation with much positivity.

Cheers,  
Bruce

I am enjoying the work with [redacted] and can appreciate the impact short-term mentorships can have on a young person's life (I did not have my first mentor until my junior year in college and, upon realizing the value, have stayed in touch with many mentors pursued and/or provided since then). I do believe mentorships will be available to be negotiated and engaged in globally and the skills developed through a sense of mentorship among equals will be valuable in projects of collaboration and cooperation in one's career.

The mentor is very impressed with Samvel and has started working on a Letter of Recommendation for him

**Based on your knowledge of this student, would you recommend this student to selective universities? Why or why not?**

Yes, I will recommend [redacted] to selective universities. We have already created a recommendation letter for that purpose.

Testimonial from Samvel who thoroughly enjoyed this mentorship opportunity and has learnt a lot from the mentor

This mentorship was a huge learning experience for me. From understanding the logic behind visualization of the data, to discussing new logic with Dr. Campbell that was to be applied to our datasets, to learning how to use python and Jupyter notebook for our goals, every step was a learning experience.

The project we chose (BCI systems) was also one that really interested me, and had actually been on the list of projects that I wanted to work on for a long time. I didn't really know how to begin with it and continue developing it, and this is another thing Dr. Campbell helped me with.

Another objective that we had was to complete a research paper on the same subject of BCI systems. This took a lot more time, but I will continue to send Dr. Campbell drafts of it until we both feel that the paper is complete.

Overall, I can't thank Dr. Campbell enough for this wonderful learning opportunity, which not only brought me a lot of new knowledge, but also helped me begin a project in an area that really interested me, and from a long time too.

# Program Sessions Outline

## Statistics with R

"Statistics with R" program will teach you the basic concepts related to Statistics and Data Analysis, and help you in applying these concept. Various examples and data-sets are used to explain the application.

<b>Session 1</b>	<b>Introduction to Statistics</b>
	<ul style="list-style-type: none"><li>• Student introduced to reading coursebook "Intro Stats"</li><li>• Professor provide Rstudio software download files.</li><li>• Within R Studio, work through the Tutorial examples and the commands in the R script files.</li><li>• Discussion of research project &amp; homework to be given</li></ul>
<b>Session 2</b>	<b>Continue "Intro Stats" coursebook and Discussion of Project</b>
	<ul style="list-style-type: none"><li>• Student introduced to reading coursebook "Intro Stats"</li><li>• Professor provide Rstudio software download files.</li><li>• Within R Studio, work through the Tutorial examples and the commands in the R script files.</li><li>• Discussion of research project &amp; homework to be given</li></ul>
<b>Session 3</b>	<b>Working with R</b>
	<ul style="list-style-type: none"><li>• Understanding basic commands of R</li><li>• Gets you started with using R by discussing basic commands such as assignment, case sensitivity and comments</li><li>• Discussion of research project &amp; homework to be given</li></ul>
<b>Session 4</b>	<b>Data Preparation</b>
	<ul style="list-style-type: none"><li>• Continue with "Intro Stats" coursebook and complete 5 exercises in each chapter prior to the next session</li><li>• Discussion of research project &amp; homework to be given</li><li>• Student to receive a mid-point evaluation from the professor</li></ul>
<b>Session 5</b>	<b>Data Analysis</b>
	<ul style="list-style-type: none"><li>• Using R to compute and display summary statistics, frequency tables and histograms</li><li>• Continue with "Intro Stats" coursebook and complete 5 exercises in each chapter prior to the next session</li><li>• Discussion of research project &amp; homework to be given</li></ul>
<b>Session 6</b>	<b>Data Analysis</b>
	<ul style="list-style-type: none"><li>• Access R project directory and execute the R scripts</li><li>• Discussion of research project &amp; homework to be given</li></ul>
<b>Session 7</b>	<b>Understanding Statistics Probability Distributions</b>
	<ul style="list-style-type: none"><li>• Continue "Intro Stats" coursebook</li><li>• Concepts of "skewness" and "kurtosis", important features of quantitative variable probability distributions.</li><li>• Discussion of research project &amp; homework to be given</li></ul>
<b>Session 8</b>	<b>Final Review Of Research Project</b>
	<ul style="list-style-type: none"><li>• Discussion of final research project and student to receive final evaluation from professor</li><li>• Questions &amp; Answer</li><li>• Student may wish to request for a Letter of Recommendation</li></ul>

\*Each program session will be customized to suit individual student's interests, needs and academic level.

# Program Sessions Outline

## Robotics - Mechanical Engineering

"Robotics - Mechanical Engineering: Building Arduino Robots & Devices" program consists of a series of practical problems on making things that work independently. We will demonstrate how to assemble such devices and programme them using the Arduino platform as a basis.

<b>Session 1</b>	<b>Introduction To Robotics</b>
	<ul style="list-style-type: none"><li>• An introduction to robotics and measurement of electrical properties</li><li>• Discussion of research project &amp; homework to be given</li></ul>
<b>Session 2</b>	<b>Theory: Receiving Data With The Help Of Sensors</b>
	<ul style="list-style-type: none"><li>• Learn how to read off digital and analog signals, exchange data with a computer</li><li>• Learn how to assemble circuits on a breadboard</li><li>• Discussion of research project &amp; homework to be given</li></ul>
<b>Session 3</b>	<b>Theory: Receiving Data With The Help Of Sensors</b>
	<ul style="list-style-type: none"><li>• Learn how to create more complex algorithms, and use new output devices.</li><li>• Discussion of research project &amp; homework to be given</li></ul>
<b>Session 4</b>	<b>Theory: Explore The World</b>
	<ul style="list-style-type: none"><li>• Learn to connect your device to a network, plan its creation beforehand</li><li>• Control heavy loads, and power your device correctly</li></ul>
<b>Session 5</b>	<b>Theory: Improve Programming Skills</b>
	<ul style="list-style-type: none"><li>• Improve your programming skills by creating a device with moving components.</li><li>• Discussion of research project &amp; homework to be given</li></ul>
<b>Session 6</b>	<b>Theory: Data Processing And Data Structures</b>
	<ul style="list-style-type: none"><li>• Processing raw data to generate useable information using Python script</li><li>• Discussion of research project &amp; homework to be given</li></ul>
<b>Session 7</b>	<b>Theory: Connecting Your Device</b>
	<ul style="list-style-type: none"><li>• Learn to connect your device to a network, plan its creation beforehand , control heavy loads, and power your device correctly</li><li>• Discussion of research project &amp; homework to be given</li></ul>
<b>Session 8</b>	<b>Final Review Of Research Project</b>
	<ul style="list-style-type: none"><li>• Discussion of final research project and student to receive final evaluation from professor</li><li>• Questions &amp; Answer</li><li>• Student may wish to request for a Letter of Recommendation</li></ul>

\*Each program session will be customized to suit individual student's interests, needs and academic level.



# Program Sessions Outline

## Gas Absorption & Stripping - Chemical Engineering

"Gas Absorption & Stripping - Chemical Engineering" program covers model separation processes involving absorption such as Packed Towers and Tray Columns.

<b>Session 1</b>	<b>Introduction to Gas Absorption &amp; Stripping</b>
	<ul style="list-style-type: none"><li>• Introduction and Mass Transfer review</li><li>• Discussion of research project &amp; homework to be given</li></ul>
<b>Session 2</b>	<b>Gas Absorption</b>
	<ul style="list-style-type: none"><li>• Physical vs Chemical absorption and Desorption &amp; Stripping</li><li>• Case studies examples</li><li>• Discussion of research project &amp; homework to be given</li></ul>
<b>Session 3</b>	<b>Tray Columns - Absorbers Part I</b>
	<ul style="list-style-type: none"><li>• Introduction to tray columns, equipment used in tray column, design and model</li><li>• Discussion of research project &amp; homework to be given</li></ul>
<b>Session 4</b>	<b>Tray Columns - Absorbers Part II</b>
	<ul style="list-style-type: none"><li>• Design and model, equilibrium stages, column operation</li><li>• Discussion of research project &amp; homework to be given</li><li>• Student to receive a mid-point evaluation from the professor</li></ul>
<b>Session 5</b>	<b>Packed Column - Absorbers</b>
	<ul style="list-style-type: none"><li>• Packed Columns vs. Tray Columns</li><li>• Introduction to packing and column structure</li><li>• Design and model</li><li>• Discussion of research project &amp; homework to be given</li></ul>
<b>Session 6</b>	<b>Advanced Systems</b>
	<ul style="list-style-type: none"><li>• Multicomponent Absorption</li><li>• Reactive Absorption</li><li>• Discussion of research project &amp; homework to be given</li></ul>
<b>Session 7</b>	<b>Software Simulation</b>
	<ul style="list-style-type: none"><li>• Introduction to Aspen Plus</li><li>• Case studies</li><li>• Discussion of research project &amp; homework to be given</li></ul>
<b>Session 8</b>	<b>Final Review Of Research Project</b>
	<ul style="list-style-type: none"><li>• Discussion of final research project and student to receive final evaluation from professor</li><li>• Questions &amp; Answer</li><li>• Student may wish to request for a Letter of Recommendation</li></ul>

\*Each program session will be customized to suit individual student's interests, needs and academic level.

# Program Sessions Outline

## C# Scripting for Unity Game Development

"C# Scripting for Unity Game Development" program provides a solid understanding of C# and basic programming concepts. Learn object oriented programming concepts and C# scripting with practical examples in Unity.

<b>Session 1</b>	<b>Introduction to Unity C# Scripting</b>
	<ul style="list-style-type: none"><li>• Downloading &amp; Installing Unity</li><li>• Getting started on basic C# scripting such as: functions, variables, arrays, loops</li><li>• Discussion of research project &amp; homework to be given</li></ul>
<b>Session 2</b>	<b>Understanding Core Unity C# Programming Part I</b>
	<ul style="list-style-type: none"><li>• Unity C# programming: searching and finding GameObjects, using GetComponent function, working with keyboard inputs</li><li>• Discussion of research project &amp; homework to be given</li></ul>
<b>Session 3</b>	<b>Understanding Core Unity C# Programming Part II</b>
	<ul style="list-style-type: none"><li>• Unity C# programming: smooth movement With Input.GetAxis, working with physics and creating player controller, shooting bullets with physics</li><li>• Discussion of research project &amp; homework to be given</li></ul>
<b>Session 4</b>	<b>Understanding Core Unity C# Programming Part III</b>
	<ul style="list-style-type: none"><li>• Unity C# programming: working with triggers, understanding LookAt function, loading game scenes/levels</li><li>• Discussion of research project &amp; homework to be given</li><li>• Student to receive a mid-point evaluation from the professor</li></ul>
<b>Session 5</b>	<b>Create 2D Monster Catch Game of Your Choice Part I</b>
	<ul style="list-style-type: none"><li>• Setting up game characters and background, creating player controller, player movement and boundaries</li><li>• Discussion of research project &amp; homework to be given</li></ul>
<b>Session 6</b>	<b>Create 2D Monster Catch Game of Your Choice Part II</b>
	<ul style="list-style-type: none"><li>• Removing and re-spawning monsters, score board, creating "game over" interface</li><li>• Discussion of research project &amp; homework to be given</li></ul>
<b>Session 7</b>	<b>Create Useful C# Scripts For The Project</b>
	<ul style="list-style-type: none"><li>• Zooming in and out in Unity with C#, rotating objects with the mouse, detecting button clicks</li><li>• Discussion of research project &amp; homework to be given</li></ul>
<b>Session 8</b>	<b>Final Review Of Research Project</b>
	<ul style="list-style-type: none"><li>• Discussion of final research project and student to receive final evaluation from professor</li><li>• Questions &amp; Answer</li><li>• Student may wish to request for a Letter of Recommendation</li></ul>

\*Each program session will be customized to suit individual student's interests, needs and academic level.

# Program Sessions Outline

## Android Developer

“Android Developer” program provides the concepts and techniques used in creating applications. Students will be able to create their very own android application.

<b>Session 1</b>	<b>Introduction &amp; Software Installation</b>
	<ul style="list-style-type: none"><li>• Installing Java JDK and Android Studio</li><li>• Android basics and overview of the interface</li><li>• Discussion of research project &amp; homework to be given</li></ul>
<b>Session 2</b>	<b>The User Interface Part I</b>
	<ul style="list-style-type: none"><li>• Building the user interface, Widgets, pixels and layouts</li><li>• Event handling</li><li>• Discussion of research project &amp; homework to be given</li></ul>
<b>Session 3</b>	<b>The User Interface Part II</b>
	<ul style="list-style-type: none"><li>• Gestures &amp; Fragments, Buttons and App Design</li><li>• Discussion of research project &amp; homework to be given</li></ul>
<b>Session 4</b>	<b>Text &amp; Animations</b>
	<ul style="list-style-type: none"><li>• Create workout advisor app and overflow menu</li><li>• Discussion of research project &amp; homework to be given</li><li>• Student to receive a mid-point evaluation from the professor</li></ul>
<b>Session 5</b>	<b>Intents and Threads</b>
	<ul style="list-style-type: none"><li>• Intents and Threads</li><li>• Discussion of research project &amp; homework to be given</li></ul>
<b>Session 6</b>	<b>Databases &amp; Multimedia</b>
	<ul style="list-style-type: none"><li>• Create and save SQLite database</li><li>• Create and edit multimedia and adding notifications to the app</li><li>• Discussion of research project &amp; homework to be given</li></ul>
<b>Session 7</b>	<b>Services and Listview</b>
	<ul style="list-style-type: none"><li>• Bound services and Listview customization</li><li>• Discussion of research project &amp; homework to be given</li></ul>
<b>Session 8</b>	<b>Final Review Of Research Project</b>
	<ul style="list-style-type: none"><li>• Discussion of final research project and student to receive final evaluation from professor</li><li>• Questions &amp; Answer</li><li>• Student may wish to request for a Letter of Recommendation</li></ul>

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# Program Sessions Outline

## Natural Language Processing

"Natural Language Processing" program covers advanced NLP on understanding and implementing word2vec and GloVe, as well as recursive neural networks for sentiment analysis.

<b>Session 1</b>	<b>Introduction &amp; Working With Word Vectors</b>
	<ul style="list-style-type: none"><li>• Pretrained word vectors with GloVe and word2vec</li><li>• Text classification</li><li>• Discussion of research project &amp; homework to be given</li></ul>
<b>Session 2</b>	<b>Language Modelling &amp; Neural Networks</b>
	<ul style="list-style-type: none"><li>• Bigrams and language models</li><li>• Neural bigram model and neural network bigram</li><li>• Discussion of research project &amp; homework to be given</li></ul>
<b>Session 3</b>	<b>Word Embeddings &amp; Word2Vec</b>
	<ul style="list-style-type: none"><li>• Negative Sampling</li><li>• Word2Vec implementation and in code</li><li>• Discussion of research project &amp; homework to be given</li></ul>
<b>Session 4</b>	<b>Word Embedding Using GloVe</b>
	<ul style="list-style-type: none"><li>• Matrix Factorization</li><li>• GloVe implementation and in Code</li><li>• Discussion of research project &amp; homework to be given</li><li>• Student to receive a mid-point evaluation from the professor</li></ul>
<b>Session 5</b>	<b>Theano &amp; Tensorflow Basics</b>
	<ul style="list-style-type: none"><li>• Theano Neural Network in Code</li><li>• Tensorflow Neural Network in Code</li><li>• Discussion of research project &amp; homework to be given</li></ul>
<b>Session 6</b>	<b>Using Neural Networks To Solve NLP Problems</b>
	<ul style="list-style-type: none"><li>• Parts-of-Speech, Named Entity Recognition</li><li>• Discussion of research project &amp; homework to be given</li></ul>
<b>Session 7</b>	<b>Recursive Neural Networks</b>
	<ul style="list-style-type: none"><li>• Recursive Neural Network in Theano, Recursive Neural Tensor Networks</li><li>• Discussion of research project &amp; homework to be given</li></ul>
<b>Session 8</b>	<b>Final Review Of Research Project</b>
	<ul style="list-style-type: none"><li>• Discussion of final research project and student to receive final evaluation from professor</li><li>• Questions &amp; Answer</li><li>• Student may wish to request for a Letter of Recommendation</li></ul>

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# Program Sessions Outline

## Stock Trading

"Stock Trading" program covers beginner and Intermediary level information to get you on the right path to becoming a successful and consistently profitable Trader.

<b>Session 1</b>	<b>Introduction To The Basics &amp; Stock Market</b>
	<ul style="list-style-type: none"><li>• Understanding the terms of stock, market, stock exchange, broker</li><li>• Discussion of research project &amp; homework to be given</li></ul>
<b>Session 2</b>	<b>Orders &amp; Prices</b>
	<ul style="list-style-type: none"><li>• Orders and order types, orders driving prices</li><li>• Different players in the market</li><li>• Discussion of research project &amp; homework to be given</li></ul>
<b>Session 3</b>	<b>Technical Analysis Part I</b>
	<ul style="list-style-type: none"><li>• Introduction</li><li>• Charts and candlesticks</li><li>• Discussion of research project &amp; homework to be given</li></ul>
<b>Session 4</b>	<b>Technical Analysis Part II</b>
	<ul style="list-style-type: none"><li>• Trends, support and resistance</li><li>• Discussion of research project &amp; homework to be given</li><li>• Student to receive a mid-point evaluation from the professor</li></ul>
<b>Session 5</b>	<b>Technical Analysis Part III</b>
	<ul style="list-style-type: none"><li>• Chart patterns</li><li>• Discussion of research project &amp; homework to be given</li></ul>
<b>Session 6</b>	<b>Technical Analysis Part IV</b>
	<ul style="list-style-type: none"><li>• Using technical indicators Bollinger Bands</li><li>• Discussion of research project &amp; homework to be given</li></ul>
<b>Session 7</b>	<b>Understanding Trading Tools &amp; Risk Management</b>
	<ul style="list-style-type: none"><li>• Stock Screener - Finviz</li><li>• Charting Platform - TradingView</li><li>• Risk management overview</li><li>• Discussion of research project &amp; homework to be given</li></ul>
<b>Session 8</b>	<b>Final Review Of Research Project</b>
	<ul style="list-style-type: none"><li>• Discussion of final research project and student to receive final evaluation from professor</li><li>• Questions &amp; Answer</li><li>• Student may wish to request for a Letter of Recommendation</li></ul>

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# Program Sessions Outline

## Music Composition & Songwriting

"Music Composition & Songwriting" program enables student to compose well-written rhythms and melodies unique to himself/herself.

<b>Session 1</b>	<b>Introduction To Music Composition &amp; Songwriting</b>
	<ul style="list-style-type: none"> <li>• Practice on "imaginary bar lines"</li> <li>• Guitar writing concepts</li> <li>• Counterpoint principles</li> <li>• Discussion of project &amp; homework to be given</li> </ul>
<b>Session 2</b>	<b>Music Composition I</b>
	<ul style="list-style-type: none"> <li>• Professor to demonstrate composite rhythm, and to add motion to the melody or bass</li> <li>• Pre-dominant chord progressions: iio, iv, V, i6/4 and N6 all lead to V</li> <li>• Pedal tone in the score and professor to demonstrate how it can be in the top or middle voice</li> <li>• Standard scoring (bass below piano)</li> <li>• Discussion of project &amp; homework to be given</li> </ul>
<b>Session 3</b>	<b>Music Composition II</b>
	<ul style="list-style-type: none"> <li>• Professor to demonstrate compound melody</li> <li>• Fine tune pieces where the piano part and bass part had clashing accidentals</li> <li>• Discussion on the different ways to complete a song piece: (1) melody first, using rhythmic motives from earlier (2) put piano motives in the voice (3) choose a sequence or other chord progression and write parts over it</li> <li>• Discussion of project &amp; homework to be given</li> </ul>
<b>Session 4</b>	<b>Lyrics Writing &amp; Melody I</b>
	<ul style="list-style-type: none"> <li>• Review of lyrics written by student and matching the lyrics with melody</li> <li>• Professor to demonstrate an example of drum notation from Samuel Adler's Orchestration</li> <li>• Discussion of project &amp; homework to be given</li> <li>• Student to receive a mid-point evaluation from the professor</li> </ul>
<b>Session 5</b>	<b>Lyrics Writing &amp; Melody II</b>
	<ul style="list-style-type: none"> <li>• Piano and bass texture, and electronic vs. live instruments</li> <li>• Song lyrics and possible ending</li> <li>• Discussion of project &amp; homework to be given</li> </ul>
<b>Session 6</b>	<b>Music Score Presentation</b>
	<ul style="list-style-type: none"> <li>• Ways to present music score professionally. Professor to proofread the piece.</li> <li>• Discussion of conventional / unusual syllable stress and a place to change stress</li> <li>• Discussion of project &amp; homework to be given</li> </ul>
<b>Session 7</b>	<b>Music Composition</b>
	<ul style="list-style-type: none"> <li>• Professor to demonstrate neighbor chords and neighbor note in bass as ways to create more varied harmonies, faster changing harmonies, and greater intensity</li> <li>• Discussion of project &amp; homework to be given</li> </ul>
<b>Session 8</b>	<b>Final Session &amp; Review</b>
	<ul style="list-style-type: none"> <li>• Discussion of final project and student to receive final evaluation from professor</li> <li>• Questions &amp; Answer</li> <li>• Student may wish to request for a Letter of Recommendation</li> </ul>

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# Program Sessions Outline

## Thesis/Dissertation Writing

“Thesis/Dissertation Writing” program covers writing a formal document that demonstrates your ability to conduct research that makes an original contribution to theory or practice. This format of writing can be applied to any subject of your interests.

<b>Session 1</b>	<b>Introduction</b>
	<ul style="list-style-type: none"><li>• Discussion of interest topic, identify research gap, contribution and objective</li></ul>
<b>Session 2</b>	<b>Write Your Literature Review</b>
	<ul style="list-style-type: none"><li>• Explaining the concepts of keywords and the current situation of your subject</li><li>• Provide conceptual and/or theoretical framework to justify use of provided materials</li><li>• Organizing paratextual materials</li><li>• Discussion of research project &amp; homework to be given</li></ul>
<b>Session 3</b>	<b>Research Problem &amp; Research Methodology</b>
	<ul style="list-style-type: none"><li>• Variables, hypothesis, operational definition</li><li>• Exploring Qualitative VS Quantitative VS Combined Methodology Analysis</li><li>• Design research study</li><li>• Discussion of research project &amp; homework to be given</li></ul>
<b>Session 4</b>	<b>Sampling &amp; Data Collection Methods</b>
	<ul style="list-style-type: none"><li>• Sampling types and criteria</li><li>• Types of data collection methods in qualitative and quantitative methods</li><li>• Discussion of research project &amp; homework to be given</li><li>• Student to receive a mid-point evaluation from the professor</li></ul>
<b>Session 5</b>	<b>Results &amp; Analysis Part I</b>
	<ul style="list-style-type: none"><li>• Introduction to statistical data analysis software: SPSS/PSPP/other open-source tools students can get access to</li><li>• Modifying software Data Editor and Output Options</li><li>• Discussion of research project &amp; homework to be given</li></ul>
<b>Session 6</b>	<b>Results &amp; Analysis Part II</b>
	<ul style="list-style-type: none"><li>• Statistical analysis in software program: charts, graphs, descriptive and inferential stats</li><li>• Entering questionnaire data into software program</li><li>• Discussion of research project &amp; homework to be given</li></ul>
<b>Session 7</b>	<b>Conclusions and Implications</b>
	<ul style="list-style-type: none"><li>• Findings conclusion and managerial recommendations</li><li>• Limitations and future research opportunities</li><li>• Discussion of research project &amp; homework to be given</li></ul>
<b>Session 8</b>	<b>Final Review Of Research Paper</b>
	<ul style="list-style-type: none"><li>• Discussion of final project and student to receive final evaluation from professor</li><li>• Questions &amp; Answer</li><li>• Student may wish to request for a Letter of Recommendation</li></ul>

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# Program Sessions Outline

## Creative Writing Workshop

“Creative Writing Workshop” program covers the structure of discovering and writing your voice in words. It includes advanced writing techniques such as the use of foreshadowing and cliffhangers, and using advanced dialogues to draw readers.

<b>Session 1</b>	<b>Introduction and Finding Your Style</b>
	<ul style="list-style-type: none"><li>• Discover your personal writing style</li><li>• Discussion of your novel ideas</li><li>• Preparing to start writing</li><li>• Discussion of project &amp; homework to be given</li></ul>
<b>Session 2</b>	<b>Planning Your Novel</b>
	<ul style="list-style-type: none"><li>• Suggest reading materials to explore yourself</li><li>• Explore and discuss your novel writing</li><li>• Plot vs. Story</li><li>• Discussion of project &amp; homework to be given</li></ul>
<b>Session 3</b>	<b>Story Structure</b>
	<ul style="list-style-type: none"><li>• Explore and discuss your novel writing</li><li>• Characters development and Three Act Structure: Act I, Act II, Act III</li><li>• Discussion of project &amp; homework to be given</li></ul>
<b>Session 4</b>	<b>Creating Manuscript Advanced Writing Techniques Part I</b>
	<ul style="list-style-type: none"><li>• Explore and discuss your novel writing</li><li>• Scene and Sequel, Conflict, Suspense, Mystery, Pacing, Viewpoint</li><li>• Discussion of project &amp; homework to be given</li><li>• Student to receive a mid-point evaluation from the professor</li></ul>
<b>Session 5</b>	<b>Creating Manuscript Advanced Writing Techniques Part II</b>
	<ul style="list-style-type: none"><li>• Explore and discuss your novel writing</li><li>• Voice, Tense, Setting, Dialogue</li><li>• Beginnings and Endings</li><li>• Discussion of project &amp; homework to be given</li></ul>
<b>Session 6</b>	<b>Advanced Dialogue</b>
	<ul style="list-style-type: none"><li>• Explore and discuss your novel writing</li><li>• To express language, accent, time period and person</li><li>• Writing internal monologues</li><li>• Discussion of project &amp; homework to be given</li></ul>
<b>Session 7</b>	<b>Further Learning</b>
	<ul style="list-style-type: none"><li>• Adding poetry to your writing</li><li>• Poetic concepts, abstract poem, narrative poetry</li><li>• Discussion of project &amp; homework to be given</li></ul>
<b>Session 8</b>	<b>Polishing Your Manuscript</b>
	<ul style="list-style-type: none"><li>• Discussion of final project and student to receive final evaluation from professor</li><li>• Questions &amp; Answer</li><li>• Student may wish to request for a Letter of Recommendation</li></ul>

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# Program Sessions Outline

## Intensive English Writing

"Intensive English Writing" program is targetted towards young learners who wish to polish and strengthen english writing and analytical skills. This program covers the MLA format, discussion and analysis of many popular literatures.

<b>Session 1</b>	<b>English Assessment &amp; Introduction</b>
	<ul style="list-style-type: none"> <li>• Access student's reading level with The Road Not Taken (Robert Frost)</li> <li>• Exploration of student's interests and passions</li> <li>• Review and discussion of MLA format and its importance</li> <li>• Homework to be given</li> </ul>
<b>Session 2</b>	<b>Discussion of MLA Formatting &amp; Introduction To Analytical Literature</b>
	<ul style="list-style-type: none"> <li>• Discussion of MLA formatting 2.0 (in text citations and headers)</li> <li>• Discussion of secondary sources and elements of dystopian literature</li> <li>• Analyze, discussion and review of literatures: "The Sky Was" by E.E. Cummings, "The Giver"</li> <li>• Review of previous homework and next homework to be given</li> </ul>
<b>Session 3</b>	<b>Analysis of Literature Part I</b>
	<ul style="list-style-type: none"> <li>• Student analysis of the first five chapters of The Giver and its aspects of dystopian society</li> <li>• Historical analysis of "O Captain! My Captain!"</li> <li>• Discussion on elements of foreshadowing</li> <li>• Review of previous homework and next homework to be given</li> </ul>
<b>Session 4</b>	<b>Analysis of Literature Part II</b>
	<ul style="list-style-type: none"> <li>• Discussion of annotations and emotions in The Giver</li> <li>• Discussion of similarities and differences between The Community to modern times</li> <li>• Review of previous homework and next homework to be given</li> <li>• Student to receive a mid-point evaluation from the mentor</li> </ul>
<b>Session 5</b>	<b>Analysis of Literature Part III</b>
	<ul style="list-style-type: none"> <li>• Discussion of the riveting conclusion in The Giver</li> <li>• Discussion on abstract vs concrete nouns, thesis statements and textual evidence, rhyme scheme and iambic pentameter</li> <li>• Close reading on Shakespeare's Sonnet 130 - "My Mistress' Eyes"</li> <li>• Review of previous homework and next homework to be given</li> </ul>
<b>Session 6</b>	<b>Identify Skills For Writing Analytical Essay</b>
	<ul style="list-style-type: none"> <li>• Understanding the question, ambiguous terms, creating a clear motion/thesis, anticipating the counterargument, using personal experience as evidence</li> <li>• Close reading on William Blake's famous 18th century romantic poem, "The Tiger".</li> <li>• Review of previous homework and next homework to be given</li> </ul>
<b>Session 7</b>	<b>Body Paragraphs &amp; Conclusions Writing</b>
	<ul style="list-style-type: none"> <li>• Discussion on the timeless classic, "Jabberwocky" by Lewis Carroll and close reading on "Ode to My Socks" by Pablo Neruda</li> <li>• Formulating body paragraphs and conclusions</li> <li>• Rhyme schemes and insights on end rhyme and internal rhyme</li> <li>• Review of previous homework and next homework to be given</li> </ul>
<b>Session 8</b>	<b>Final Session &amp; Review</b>
	<ul style="list-style-type: none"> <li>• Crafting a clear and concise thesis statement</li> <li>• Questions &amp; Answer</li> <li>• Student may wish to request for a Letter of Recommendation</li> </ul>

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