BIS: Computer Science, Statistics, Psychology

Science and technology have been something I have been fascinated with since I was young. However, my true love for technology had not been properly realized until entering College. After taking an introductory programming course out of pure curiosity, I was instantly hooked. My passion for technology had been reignited. Although I knew the field of computing was something I wanted to pursue, artificial intelligence, specifically machine learning was the sub-field I had set my eyes on. After reading more and more about the field, I realized general knowledge in the domain of computer science would not suffice. After finding out about the BIS program, I knew it would be right for me.

Machine learning focuses on building programs that have the ability to learn over time. This is done by the study and construction of algorithms that can learn from and make predictions on data. These algorithms operate by building a model from example inputs in order to make data-driven predictions or decisions. As a result, a solid background in statistics is absolutely necessary to develop the skills needed for this field. Next, I thought about my other interests. The understanding of how humans think and behave can assist us in understanding how humans use machines. This understanding of human computer interaction is essential to building efficient machines which is why I chose Psychology as my third area of concentration. My current goal is to become a software engineer in the field of machine learning at a technology company. With the course selections I have made, I will have the diverse set of skills needed to succeed as an engineer.
Computer Science

Computer science is the systematic study of the structure, expression, and mechanization of the methodical procedures or algorithms that are executed by machines explicitly programmed to. The field of machine learning is a specific subset of computer science. Consequently, a deep understanding of the fundamentals of computer science is essential to acquire expertise in the field of machine learning.

*CSCI 2011 - Discrete Structures of Computer Science*

This course was the first course that really pushed me to think creatively in my problem solving approaches. After completing this course, I was supplied with the fundamental knowledge in topics such as logic, number theory, and probability that would prepare me for more rigorous and theoretical courses in computer science.

*CSCI 2021 - Machine Architecture & Organization*

Knowing what goes on under the hood of a computer is essential for a good understanding of Computer Science. As the most difficult course I have taken in my undergraduate career thus far, I can say what I learned was absolutely invaluable. In addition to learning how a computer manages its processor instructions and memory, I learned the C programming language along with a small amount of Assembly (IA32 Instruction set).

*CSCI 4041 - Algorithms & Data Structures*

Algorithms is essentially the heart of computer science. The speed and efficiency of computers has been increasing at an exponential rate. However, writing an inefficient algorithm for a large scale problem can lead to huge consequences when it comes to the cost of resources. The heart of machine learning are the algorithms used to make predictions and decisions on
enormous sets of data. Properly evaluating and optimizing algorithms is necessary to avoid inefficiencies in programs. This course has taught me how to evaluate a given problem (known or unknown), come up with a solution, and prove the efficiency of such a solution.

**CSCI 4061 - Introduction to Operating Systems**

Introduction to Operating systems builds on what I learned in Machine Architecture by going one level of abstraction above the knowledge I had gained in that course. I have been learning how to write code that exploits features of a Unix operating system. Having only had taken one course that had briefly discussed Unix, I felt that deeper knowledge on Unix would be essential since most of the programming I will be doing as an engineer will be in a Unix environment.

**CSCI 5521 - Introduction to Machine Learning**

Since my end goal is to enter the machine learning industry, it is only natural for me to establish a solid foundation in machine learning concepts. Taking this course will give me insight on different data classification algorithms along with the statistical and mathematical knowledge that these algorithms are based on.

**Statistics**

Statistics is the study of the collection, analysis, interpretation, and organization of data. Since machine learning heavily relies on algorithms that interpret and make predictions based on
datasets, an expertise in the field of statistics is absolutely necessary to understand how machines can make use of and learn from data.

**STAT 3011 - Introduction to Statistical Analysis**

Introduction to Statistical Analysis focuses on the very basics of the field of statistics. Although this was a course I had taken several years ago while enrolled in college while in high school, I was able to establish a good base to build upon with my future courses in statistics.

**STAT 3021 - Introduction to Probability & Statistics**

Introduction to Probability & Statistics also focuses on the basics, along with more advanced topics in probability distributions, regression, and statistical inferences. This course greatly assisted me in refreshing my knowledge of statistics while learning new topics and applying them to real-world problems. In addition, I worked with the R programming language which is the most heavily used language in the field of machine learning. As a result of this course, I feel my transition into more mathematical statistics courses will be much smoother.

**STAT 4101 - Theory of Statistics I**

In statistics and the development of statistical models, it is essential to have a solid base in the mathematical aspects of statistics. In comparison to Introduction to Probability & Statistics, this course is more theory-focused and uses calculus. The ability to think in a more mathematical sense about statistical problems further develop my skills in data modeling and analysis.

**STAT 3022 - Data Analysis**

Data analysis builds upon Introduction to Probability and Statistics by providing an overview to modern statistical methods and software. This course will further my experience
with the R programming language and teach me how to know what statistical techniques to apply to a given situation.

**Psychology**

Psychology is the scientific study of human behavior. While not directly related to the more quantitative areas of computer science and statistics, an understanding of how humans interact with machines is essential when building the most optimal and efficient machines.

*PSY 3801 - Psychological Measurement & Data Analysis*

This course introduces the skills necessary for proper analysis of psychological data. Topics that are covered include descriptive and inferential statistics. I have enjoyed the crossover that this course has with other statistics courses that I have taken. The applications to psychological data in this course has helped my ability in applying statistics to various real-world problems.

*PSY 3001W - Introduction to Research Methods*

Since I haven’t done any type of formal research during my undergraduate career, I felt that it was necessary to learn the basic concepts and procedures used to conduct and evaluate research in psychology. This course is also important for the development of sound writing skills. I hope to apply these concepts to research in the machine learning field.

*PSY 3011 - Introduction to Learning and Behavior*

Introduction to learning and behavior introduces the fundamental phenomena and principles of learning and behavior analysis. I believe a deeper understanding of how humans learn and behave will assist me in understanding the processes behind machines that are able to learn on their own.
PSY 5014 - Psychology of Human Learning and Memory

Psychology of Human Learning and Memory builds upon the methods of analysis of human behavior and learning. This course focuses on memory encoding, decoding, and the brain systems that biologically support memory.

Conclusion:

The field of machine learning and artificial intelligence is a booming industry. I believe that my B.I.S program will not only help me find work in this field, but excel due to the broad yet overlapping subjects that I have chosen while pursuing my degree. The process of learning these three disciplines has exposed myself to a wide variety of problems and methods in approach them. Throughout this experience I have also thought of different problems I can tackle on my own, and I cannot wait to begin.

BIS/IDIM Program Course Worksheet

Name: 
ID#: 

Total number of credits in proposed program: 50
Total number 3/4/5xxx level credits in proposed program: 50
Total credits in program left to complete: 

IDIM Title: 

Concentration One

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**TOTALS:**
- 3/4/5xxx level credits in area: 20
- Total credits in area (IDIM only): 20

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**TOTALS:**
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- Total credits in area (IDIM only): 15

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**TOTALS:**
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- Total credits in area (IDIM only): 15