

## Overview

*Going forward, I would like to transfer my semiconductor/data knowledge to additive manufacturing, gene therapy, artificial intelligence, or applied neuroscience themes.*

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Given the privilege, my degrees in Chemical Engineering and Physical Chemistry, along with a solid research background in Materials Science, provide ample experience to perform the duties required of this position. Most semiconductor projects I encountered, involved either processing or analysis, so I am strong in both areas.

With over 20 years as a Research Scientist, I have coauthored roughly 16 papers, half under the direction of John Haggerty at MIT, and the remainder with support from Klaus Bachmann at NC State. During the course of research, I have: (1) grown the first laser-induced, chemical vapor deposition, amorphous silicon solar cells, (2) developed a microwave plasma, chemical vapor deposition system, to create polycrystalline diamond from methane gas, in a regime where kinetics dominates over thermodynamics, (3) monitored the surface evolution of compound semiconductor heterostructure films, in a chemical beam epitaxy system, with plane polarized reflectance spectroscopy, pioneered by our research group.

In more recent years, I plunged into the world of macroeconomics, human behavior, and statistical analysis, through futures trading. Using quantitative investment strategies, participants seek high probability trades. To handle market data, I applied digital signal processing techniques, in the spirit of John Ehlers, an Electrical Engineer from Raytheon. Along the way, I combined statistics with digital signal processing to produce highly responsive indicators, enhancing trade signal clarity. By immersing myself in the data science of financial markets, and backtesting of trading strategies, I have improved my computer programming skills, and established more techniques to deal with data interpretation.

Going forward, I would like to transfer my semiconductor/data knowledge to additive manufacturing, gene therapy, artificial intelligence, or applied neuroscience themes. I invite you to visit my personal website to view current literature and computational projects. If you have any concerns, feel free to contact me.

*Christopher J Harris*

## Christopher J Harris

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<http://cjharris.tk/>

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**Profile** *Chemical Engineer* with over 20 years of semiconductor research and 10 years of data science seeking to redefine opportunity in the *industrial sector*:

crystal growth	plasma chemistry	gene therapy
surface science	laser excitation	applied neuroscience
chemical vapor deposition	optical characterization	computer modeling
molecular beam epitaxy	electrochemical methods	statistical analysis
semiconductor devices	additive manufacturing	process control

**Thesis** *Real Time Reflectometry of Ga-based Compound Semiconductor Films on Silicon during Plasma Enhanced Molecular Beam Epitaxy*, NCSU Materials Science Dept: **1999**.

### Clifton Strengths

<b>Character</b>	<i>Strategic</i>	faced with any given scenario, can quickly spot the relevant patterns.
	<i>Learner</i>	have a great desire to learn and want to continuously improve.
	<i>Ideation</i>	able to find connections between seemingly disparate phenomena.
	<i>Futuristic</i>	inspired by the future and what could be.
	<i>Self-Assurance</i>	possess an inner compass yielding confidence in decision making.

**Milestone** Invent a new approach for process control to optimize laser power.

Write a Pascal based data acquisition program for DOS environment in 1986, long before LabView enters the Windows market.

Analyze optical signals from a ceramic powder reaction chamber, leading to a computer monitoring scheme, which replaces a human operator.

Construct interferometer to measure film thickness, providing a realtime signal, to calibrate growthrate.

Refine process control loop to stabilize laser power, producing a steady deposition rate with reliable material properties.

Collect in-situ stress measurements of growing films, through deflection of an optical laser, as sample curvature evolves.

Grow the first laser-induced, chemical vapor deposition, amorphous silicon solar cell.

Develop a microwave plasma, chemical vapor deposition system, to create polycrystalline diamond from methane gas, in a regime where kinetics dominates over thermodynamics.

Achieve a unique ellipsoidal plasma advantageous for film growth over spherical plasmas.

Design a radio frequency nitrogen plasma source for GaN film growth.

Monitor the surface evolution of compound semiconductor heterostructure films, in a chemical beam epitaxy system, with plane polarized reflectance spectroscopy.

Derive substrate temperature from plane polarized reflectance intensity.

Apply cyclic voltammetry to find: catalytic activity in gold compounds for methanol oxidation, and electrochemiluminescence in a ruthenium compound for DNA analysis.

	Positon	Salary	Reason for leaving
Experience	<i>Engineering Consultant</i> , Independent (1/18 to present)		Negligible income until contracts emerge, in the meantime, develop webpage content
	<i>Futures Trader</i> , Independent (9/06 to present)		Negligible income due to lack of capital, but paper trade and focus on data analysis
	<i>Research Assistant</i> , Maine Chemistry Dept: Orono, ME (8/03 to 5/06)	\$ 12,000 / yr	Help parents with health issues in rural Maine, five years, while exploring futures trading
	<i>Teaching Assistant</i> , Rutgers Chemistry Dept: New Brunswick, NJ (1/00 to 1/03)	\$ 12,000 / yr	Finish degree
	<i>Research Assistant</i> , NCSU Materials Science Dept: Raleigh, NC (1/87 to 5/99)	\$ 12,000 / yr	Graduate student offer at Rutgers
	<i>Research Specialist</i> , MIT Advanced Energy Materials Lab: Cambridge, MA (11/84 to 1/87)	\$ 26,500 / yr	Graduate student offer at NC State
	<i>Stock Investor</i> , Independent (5/84 to 9/06)	\$ 25,000 / yr	Switch from stocks to futures and include technical analysis
Intern	<i>Mass Field Station</i> : Waltham, MA (5/83 to 8/83)		Grow vegetables on sewage sludge layers to determine plant uptake of heavy metals.
	<i>International Paper</i> : Camden, AR (5/82 to 8/82)		Apply quality control principles to glossy file folder stock in a papermill process.
	<i>Sun Oil Company</i> : Main Pass, LA (5/81 to 8/81)		Perform system maintenance, technical evaluation on an offshore oil & gas production platform: MP-293A.
	<i>Sun Oil Company</i> : Snyder, TX (5/80 to 8/80)		Explore gas compressor repair, plant process control on a cryogenic natural gas processing facility.
Education	MS <i>Physical Chemistry</i>	Rutgers: New Brunswick, NJ	Jan 2003
	MS <i>Material Science</i>	North Carolina State: Raleigh, NC	unofficial
	BS <i>Chemical Engineering</i>	Texas A&M: College Station, TX	May 1984
	HS <i>Diploma</i>	Waltham High: Waltham, MA	Jun 1979
Certificate	<i>Computational Investing</i>	Georgia Tech: Coursera	Dec 2014
	<i>Computational Neuroscience</i>	Washington: Coursera	Jul 2015
	<i>Data Scientist's Toolbox</i>	Johns Hopkins: Coursera	Mar 2015
	<i>Python Programming for Everybody</i>	Michigan: Coursera	May 2015
	<i>Data Analysis and Statistical Inference</i>	Duke: Coursera	May 2015
Honor	<i>Bausch &amp; Lomb Science Award</i>		





DECEMBER 10, 2014

# Statement of Accomplishment

WITH DISTINCTION

## CHRISTOPHER HARRIS

HAS SUCCESSFULLY COMPLETED GEORGIA INSTITUTE OF TECHNOLOGY'S ONLINE OFFERING OF



### Computational Investing, Part I

This course covers computational aspects of investing, including: Company valuation, the Capital Assets Pricing Model, Efficient Markets Hypothesis, the role of information in pricing, historical data and its manipulation, portfolio performance assessment and optimization.

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TUCKER BALCH, PH.D.  
ASSOCIATE PROFESSOR  
COLLEGE OF COMPUTING  
GEORGIA INSTITUTE OF TECHNOLOGY

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NELSON BAKER, PH.D.  
DEAN, PROFESSIONAL EDUCATION  
GEORGIA INSTITUTE OF TECHNOLOGY

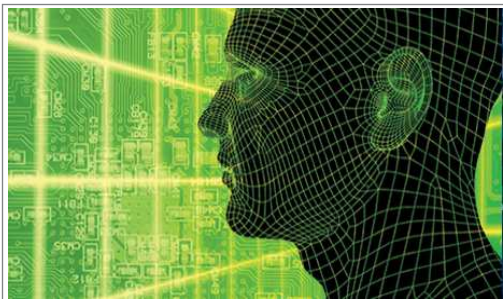
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JULY 02, 2015

# Statement of Accomplishment


## CHRISTOPHER HARRIS

HAS SUCCESSFULLY COMPLETED THE ONLINE OFFERING OF



### Computational Neuroscience

This advanced undergraduate course introduces a broad range of computational techniques for analyzing, modeling, and understanding the behavior of neurons and networks of neurons in the brain.

  
**W** UNIVERSITY of WASHINGTON

DR. RAJESH P. N. RAO  
PROFESSOR  
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING  
UNIVERSITY OF WASHINGTON

  
**W** UNIVERSITY of WASHINGTON

DR. ADRIENNE FAIRHALL  
ASSOCIATE PROFESSOR  
DEPARTMENT OF PHYSIOLOGY AND BIOPHYSICS  
UNIVERSITY OF WASHINGTON

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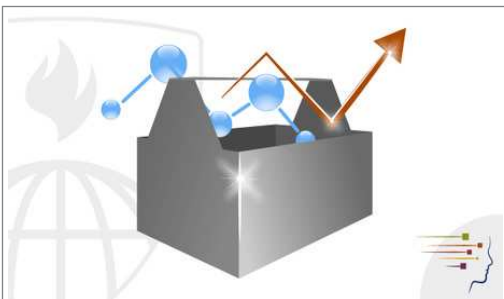
MARCH 08, 2015

# Statement of Accomplishment

WITH DISTINCTION

## CHRISTOPHER HARRIS

HAS SUCCESSFULLY COMPLETED THE JOHNS HOPKINS UNIVERSITY'S OFFERING OF



### The Data Scientist's Toolbox

Overview of the data, questions, & tools that data analysts & scientists work with. It is a conceptual introduction to the ideas behind turning data into knowledge as well as a practical introduction to tools like version control, markdown, git, GitHub, R, and RStudio.

JEFFREY LEEK, PHD  
DEPARTMENT OF BIostatISTICS, JOHNS HOPKINS  
BLOOMBERG SCHOOL OF PUBLIC HEALTH

ROGER D. PENG, PHD  
DEPARTMENT OF BIostatISTICS, JOHNS HOPKINS  
BLOOMBERG SCHOOL OF PUBLIC HEALTH

BRIAN CAFFO, PHD, MS  
DEPARTMENT OF BIostatISTICS, JOHNS HOPKINS  
BLOOMBERG SCHOOL OF PUBLIC HEALTH

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MAY 07, 2015

# Statement of Accomplishment

WITH DISTINCTION

## CHRISTOPHER HARRIS

HAS SUCCESSFULLY COMPLETED



### Programming for Everybody (Python)

The Programming for Everybody (#PR4E) course from the University of Michigan School of Information introduces students to the Python programming language and studies how Python can be used to do data analysis.

A handwritten signature in black ink, appearing to read "Charles", followed by a horizontal line.

CHARLES SEVERANCE  
CLINICAL ASSOCIATE PROFESSOR, SCHOOL OF INFORMATION  
UNIVERSITY OF MICHIGAN

PLEASE NOTE: THE ONLINE OFFERING OF THIS CLASS DOES NOT REFLECT THE ENTIRE CURRICULUM OFFERED TO STUDENTS ENROLLED AT THE UNIVERSITY OF MICHIGAN. THIS STATEMENT DOES NOT AFFIRM THAT THIS STUDENT WAS ENROLLED AS A STUDENT AT THE UNIVERSITY OF MICHIGAN IN ANY WAY. IT DOES NOT CONFER A UNIVERSITY OF MICHIGAN GRADE; IT DOES NOT CONFER UNIVERSITY OF MICHIGAN CREDIT; IT DOES NOT CONFER A UNIVERSITY OF MICHIGAN DEGREE; AND IT DOES NOT VERIFY THE IDENTITY OF THE STUDENT.



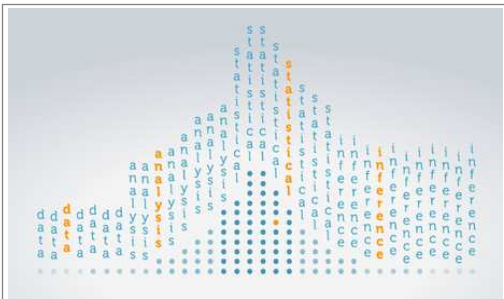
MAY 19, 2015

# Statement of Accomplishment

WITH DISTINCTION

## CHRISTOPHER HARRIS

HAS SUCCESSFULLY COMPLETED AN ONLINE NON-CREDIT COURSE OFFERED BY DUKE UNIVERSITY.



### Data Analysis and Statistical Inference

This course introduces students to core statistical concepts such as exploratory data analysis, statistical inference and modeling, and basic probability, as well as statistical computing.

DR. MINE ÇETINKAYA-RUNDEL  
ASSISTANT PROFESSOR OF THE PRACTICE  
STATISTICAL SCIENCE, DUKE UNIVERSITY