

Board of Governors, State University System of Florida **REQUEST TO OFFER A NEW DEGREE PROGRAM** In Accordance with BOG Regulation 8.011

(Please do not revise this proposal format without prior approval from Board staff)

New College of Florida

Mau

Institution Submitting Proposal

New College of Florida Name of College(s) or School(s)

Applied Data Science Academic Specialty or Field Fall 2021

Proposed Implementation Term

Graduate Studies Name of Department(s)/Division(s)

Master of Science in Applied Data Science **Complete Name of Degree**

11.0104 Informatics Proposed CIP Code (2020 CIP)

The submission of this proposal constitutes a commitment by the university that, if the proposal is approved, the necessary financial resources and the criteria for establishing new programs have been met prior to the initiation of the program.

February 11,	2020		
Date Approv	ed by the	University Board of	
Trustees	-	-	
11.	0	(

Board of Trustees Chair's Signature

Charles hi-	2/11/21
President's Signature	Date

 and a particular sub-	
	Date

Suzanne Sherman	2/11/21
Provost's Signature	Date

PROJECTED ENROLLMENTS AND PROGRAM COSTS

2/11/21

Date

Provide headcount (HC) and full-time equivalent (FTE) student estimates of majors for Years 1 through 5. HC and FTE estimates should be identical to those in Table 1 - Appendix A. Indicate the program costs for the first and the fifth years of implementation as shown in the appropriate columns in Table 3 in Appendix A. Calculate an Educational and General (E&G) cost per FTE for Years 1 and 5 (Total E&G divided by FTE).

Implementation Timeframe	нс	FTE	E&G Cost per FTE	E&G Funds	Contract & Grants Funds	Auxiliary/ Philanthropy Funds	Total Cost
Year 1	24	24.00	\$17,583	\$422,000	\$0	\$0	\$422,000
Year 2	48	36.00					
Year 3	49	37.00					
Year 4	50	38.00					
Year 5	52	40.00	\$14,075	\$563,000	\$0	\$0	\$563,000

Note: This outline and the questions pertaining to each section must be reproduced within the body of the proposal to ensure that all sections have been satisfactorily addressed. Tables 1 through 4 are to be included as Appendix A and not reproduced within the body of the proposals because this often causes errors in the automatic calculations.

Introduction

I. Program Description and Relationship to System-Level Goals

A. Briefly describe within a few paragraphs the degree program under consideration, including (a) level; (b) emphases, including majors, concentrations, tracks, or specializations; (c) total number of credit hours; and (d) overall purpose, including examples of employment or education opportunities that may be available to program graduates.

To meet regional workforce needs and provide a direct pathway to high-paying jobs for motivated Florida students, New College of Florida proposes to offer a <u>Master of Science in Applied Data</u> <u>Science</u> program to begin Fall 2021. This program will build upon the expertise of faculty in our quickly-growing undergraduate computer science, statistics, and data science programs, as well as our long-standing undergraduate applied math program, and will help close the skills gap our local employers face.

The unique emphasis of this two-year, 36 credit hour program is the *application of data science* to help solve complex problems in fields such as healthcare, logistics, commerce, and public policy using artificial intelligence and other computational techniques. In the project-based statistics, computing, and data science courses of this new program, students will work in teams to analyze real datasets from both internal campus and external corporate partners. Complementing their coursework, students will participate each semester in an Industrial Seminar Series to learn from visiting professionals how cutting-edge data science techniques are used in a variety of industries. Students will also complete two in-depth Industrial Practicums, including a final, full-time, semester-long practicum with a corporate partner, to prepare them to immediately enter the workforce upon graduation.

The purpose of the Master of Science in Applied Data Science program is to equip motivated students with the hard skills (statistics, applied math, and computer science), soft skills (critical thinking, written and verbal communication, teamwork, time management, perseverance), and hands-on experience that will propel them into the workforce of this dynamic area. By eliminating all unnecessary prerequisites and requiring students to participate in an Introduction to Data Science Bootcamp, we believe we can recruit, attract, enroll, and retain a highly diverse population of motivated students. These motivated students will gain hard and soft skills as they progress through our rigorous project-based curriculum, developed in consultation with an Industrial Advisory Board. Finally, by completing two practicums in data science with our corporate partners, our graduates will be fully prepared to fill the needs of local, regional, and statewide employers.

A distinctive aspect of the proposed program is its tight integration with the undergraduate areas of concentrations at New College through the 3+2 program being offered simultaneously with the MS program. The 3+2 program will allow NCF undergraduates to obtain an undergraduate degree in any area of intellectual interest, pair it with a highly marketable master's degree in data science, and earn the two degrees in five years. This group of students will arrive having already completed a number of preparation courses in their first two years, so they will start taking graduate courses in their junior year without having to complete the Introduction to Data Science Bootcamp. We expect that this construct will appeal to prospective undergraduate students across the state and the country and help NCF recruit more undergraduate students, thereby increasing overall enrollment at New College.

New College graduates recently placed in data science and STEM-related positions provide strong examples of the employment opportunities available to program graduates. New College graduates have been placed into data scientist and analyst positions in such organizations as Amazon, Akamai, LexisNexis, Elutions (technology and automation), McKinsey & Co. (consulting), American Express, Blackrock, FIS Global (finance), Cigna, Voalte/Hillrom, Syft (healthcare), Novetta, CACI, Army Research Lab (defense), Star2Star (telecommunications), Stantec (environmental consulting), the City of Baltimore (public service), Gracenote (entertainment), and Hughes Research Labs (technology development). Many of these organizations are Florida-based, allowing the new program to serve the local and regional

demand for qualified data science professionals. Our graduates with Master of Science degrees in Applied Data Science will further respond to workforce demands in this burgeoning field of study.

In fulfilling its purpose, the Master of Science in Applied Data Science program will help New College of Florida increase enrollment and lower its cost-per-degree — two fundamental goals of the New College Strategic Plan. It will also help New College achieve its Universities of Distinction goals to build relationships with local employers and place students in hands-on applied learning experiences.

Summary:

- (a) Level: Master of Science in Applied Data Science
- (b) Emphases: The program has no sub-concentrations, tracks, or specializations.
- (c) Total number of credit hours: 36
- (d) Purpose: The purpose of the Master of Science in Applied Data Science program is to equip motivated students with the hard skills (statistics, applied math, and computer science), soft skills (communication, teamwork, perseverance), and hands-on experience that will propel them into the workforce of this dynamic area.
- B. Please provide the date when the pre-proposal was presented to CAVP (Council of Academic Vice Presidents) Academic Program Coordination review group. Identify any concerns that the CAVP review group raised with the pre-proposed program and provide a brief narrative explaining how each of these concerns has been or is being addressed.

The CAVP Academic Program Coordination review group raised no concerns when the pre-proposal was presented on September 24, 2020.

C. If this is a doctoral level program please include the external consultant's report at the end of the proposal as Appendix D. Please provide a few highlights from the report and describe ways in which the report affected the approval process at the university.

The Master of Science in Applied Data Science program is not a doctoral level program.

D. Describe how the proposed program is consistent with the current State University System (SUS) Strategic Planning Goals. Identify which specific goals the program will directly support and which goals the program will indirectly support (see link to the SUS Strategic Plan on the resource page for new program proposal).

In awarding Master of Science in Applied Data Science degrees, the program will directly:

- increase the number of degrees awarded in STEM (a goal within the *Strategic Priorities* for a Knowledge Economy of Teaching and Learning)
- increase program efficiency for New College of Florida (a *productivity* goal of *Teaching and Learning*)
- strengthen the quality and reputation of New College of Florida (an *excellence* goal of *Teaching and Learning*)

Through its Industrial Advisory Board (consisting of professionals and executives from local firms) and placement of students in practicums, the proposed program will directly:

- strengthen the quality and recognition of commitment to community and business engagement (an excellence goal of Community and Business Engagement)
- increase levels of community and business engagement (a *productivity* goal of *Community and Business Engagement*)
- increase community and business workforce (a goal within the *Strategic Priorities for a Knowledge Economy* of *Community and Business Engagement*)

In building relationships with corporate partners and gaining access to real-world datasets that may be integrated into our undergraduate program, the proposed program will indirectly:

• increase undergraduate participation in research to strengthen the pipeline of

researchers pursuing graduate degrees (an excellence goal of Scholarship, Research, and Innovation)

- E. If the program is to be included in a category within the Programs of Strategic Emphasis as described in the SUS Strategic Plan, please indicate the category and the justification for inclusion. The Programs of Strategic Emphasis Categories are:
 - Critical Workforce:
 - □ Education
 - Health
 - □ Gap Analysis
 - Economic Development:
 - □ Global Competitiveness
 - Science, Technology, Engineering, and Math (STEM)

Please see the Programs of Strategic Emphasis (PSE) methodology for additional explanations on program inclusion criteria at <u>the resource page for new program</u> <u>proposal</u>.

The proposed New College of Florida Master of Science in Applied Data Science falls within the 11.0104 Informatics CIP code as:

A program that focuses on computer systems from a user-centered perspective and studies the structure, behavior and interactions of natural and artificial systems that store, process and communicate information. Includes instruction in information sciences, human computer interaction, information system analysis and design, telecommunications structure and information architecture and management.

The Master of Science in Applied Data Science program, which integrates knowledge and skills from statistics, computer science, and applied mathematics, is designed to produce workforce-ready professionals in strategic areas of high demand. Students in the program will gain a foundation in machine learning, data mining, algorithms, modeling, statistics and analytics, and will also gain practical experience in applying this foundational knowledge to solve real-world problems. These technical skills and practical experience will equip our graduates with the ability to help businesses of <u>all</u> industries collect, manage, analyze and interpret data necessary to solve pressing problems. As such, it will contribute to the Economic Development - STEM category.

F. Identify any established or planned educational sites at which the program is expected to be offered and indicate whether it will be offered only at sites other than the main campus.

The Master of Science in Applied Data Science coursework will only be offered at New College's main campus. Industrial Practicums I and II, which effectively are internships, will take place either on company sites or remotely.

Institutional and State Level Accountability

II. Need and Demand

A. Need: Describe national, state, and/or local data that support the need for more people to be prepared in this program at this level. Reference national, state, and/or local plans or reports that support the need for this program and requests for the proposed program which have emanated from a perceived need by agencies or industries in your service area. Cite any specific need for research and service that the program would fulfill.

The Master of Science in Applied Data Science program will help build capacity within the SUS to address the shortage in trained data scientists in Florida and the rest of the U.S. In Florida, computing and math occupations are among the fastest growing occupations, with a 14.5% projected growth into 2027 (Florida Department of Economic Opportunity, 2019). This growth rate is mirrored across the U.S., as the Bureau of Labor Statistics projects a 15% growth rate into 2029. Graduates of the proposed New College of Florida Master of Science in Applied Data Science program will contribute to the thriving tech industry growing within the Florida High Tech Corridor, a 23-county region of Florida serving as an incubator of high-tech innovation. The Florida High Tech Corridor currently has 22,000 tech companies from 10 high tech sectors that all have a need for data scientists with domain knowledge (ie. a Bachelor's degree) in a professional field. Locally, Sarasota county is ranked #6 for best performing cities in the US primarily driven by the growth of the technology sector (Milken Institute, 2017).

Other recent national studies further support the growing need for trained data scientists:

- LinkedIn ranks Data Scientist the #3 emerging job in 2020, noting that it has a 37% annual growth rate and that "data science is booming and starting to replace legacy roles." (LinkedIn, 2020)
- LinkedIn also listed Data Scientist as the #1 promising job in 2019, noting an average salary of \$130,000 and a 56% increase in job openings (<u>Tech Republic, 2019</u>)
- quanthub calculates a 250,000 shortage in data scientists, noting that the growth in job postings is three times higher than the growth in job searches since 2015. quanthub also notes that salaries for data scientists have risen 14% per year, on average, and that 67% of companies are expanding their data science teams (quanthub, 2020)

Limiting the search to the 11.0104 (Informatics) CIP code within Florida results in the same projections of strong growth in employment opportunities:

Metric	Value	Source
Year-over-year increase in job postings in Florida	34%	Burning Glass Technologies
Year-over-year growth in direct preparation jobs in Florida	13%	Bureau of Labor Statistics
3-year annualized growth in direct preparation jobs in Florida	6%	Bureau of Labor Statistics
Job openings per graduate in Florida	1.4	Burning Glass Technologies; Gray Associates; IPEDS
Average wage	\$114,298	American Community Survey
25th percentile wage	\$50,891	Bureau of Labor Statistics

Employment Data for 11.0104 CIP (Informatics)*

*All data were updated by Gray Associates on October 28, 2021

The proposed Master of Science in Applied Data Science program will prepare students with a foundation in machine learning, data mining, algorithms, modeling, statistics and analytics, but more importantly, provide ample opportunities for practical experience to apply this foundational knowledge to solve real-world problems. These technical skills as well as the practical experience will equip our graduates with the ability to help businesses of <u>all</u> industries collect, manage, analyze and interpret data necessary to solve pressing problems. Nationally, "big data" occupations are projected to increase 27.9% into 2026 including specific jobs such as Computer and Information Research Scientists, Operations Research Analysts, and Business Intelligence Analysts projected to increase 15%, 25%, and 11% respectively into 2029 (Bureau of Labor Statistics, 2019). The following tables further detail statistics on the demand for qualified professionals in these job descriptions.

Table: Master's Level Computer and Information Research Scientists Occupational Data

Computer and Information Research Scientists (source: <u>Bureau of Labor Statistics</u>)

2019 Median Pay	\$122,840 per year
	\$59.06 per hour
Typical Entry-Level Education	Master's degree
Work Experience in a Related Occupation	None
On-the-job Training	None
Number of Jobs, 2019	32,700
Job Outlook, 2019-29	15% (Much faster than average)
Employment Change, 2019-29	5,000

Table: Keywords search for data science and computer science USAjobs.gov

Key Word	Number of jobs	Example Job Titles
Data Science	1,041	Information Technology Specialist, IT Cybersecurity Specialist, Statistician, Data Scientist
Computer Scientist	909	Computer Scientist, Data Steward, Interdisciplinary Scientist

Beyond the growing number of employment opportunities available to trained data scientists, particularly at the master's level, the need for the Master of Science in Applied Data Science program at New College of Florida is evidenced by the related research and service needs our faculty and students fulfill. Some of the projects our students and faculty have conducted with the goal of serving the immediate needs of our community include:

- analyzing human mobility data to understand socio-economic impact of COVID-19 (SafeGraph)
- predicting patient readmission risk by analyzing doctors' notes (Florence A. Rothman Institute of Sarasota)
- medical fraud detection from insurance records (Jonathan Kroner Law Office)
- analyzing and developing metrics to improve performance of online learning platforms (Riff Analytics)
- collecting and analyzing dolphin sound in Sarasota Bay to understand dolphin movement (Loggerhead)
- analyzing local government financial metrics to understand city solvency (MIT Sloan School of Management)
- analyzing GPS data to detect illegal fishing activity along state and national shorelines (Novetta)

By training students at the master's level, New College will grow capacity to further meet the needs of the local community and state. New College of Florida has already developed ties with a growing number of corporate partners — firms who have shared datasets for analysis, reached out to New College for support with data science needs, or hosted New College students in internships — which are listed below:

Adgorithmics Akamai Allen Brain Institute Ancestry.com Distilled Analytics Divers Alert Network Epic Systems FIS Global Novetta NVIDIA Perspecta PropLogix

Army Research Lab	Florence A. Rothman Institute	Pro
AventuSoft	Gracenote	Saa
Bank of America	Hughes Research Laboratories	Sar
Bar None Systems	Intergreen USA	SAS
Bealls	Leidos	Site
BlackRock Inc	Lexiflor	Sta
Blue Cross Blue Shield	LexisNexis	Sta
Cienga Security	Loggerhead	Теа
City of Baltimore	Lovelace Respiratory Research	Ulti
Clarifai	Institute	UM
Colchis Capital	Lovepop	US
Connections Media	Mind Research Network	Ver
CoreLogic	NASA Langlev Research Center	Voa
Dendra	Ned Davis Research	W2

Prospect Bio Saatchi & Saatchi Wellness Sarasota Memorial Hospital SAS SiteSpect Stantec Consultancy Services Star2star Teachers Pay Teachers Ultimate Software UMass Amherst USGS Vencore Voalte W20

The state and national employment projections and examples of service to local employers and research institutes provided in this section demonstrate a strong need for the data scientists that will be produced by this proposed Master of Science in Applied Data Science program.

B. Demand: Describe data that support the assumption that students will enroll in the proposed program. Include descriptions of surveys or other communications with prospective students.

Market research, the demonstrated success of our related undergraduate concentrations, and our well-established history of New College graduates going on to earn advanced degrees in STEM fields all provide strong evidence that students will enroll in the proposed Master of Science in Applied Data Science program.

In 2019, New College of Florida worked with a market research firm to investigate the steps needed to increase enrollment. Through in-depth interviews (with inquiring students, admitted applicants, current students, and students who left New College) and a proprietary Simulated Decision Modeling methodology, their research identified a short list of recommendations that they projected would increase both applications and acceptances by 60%. The Master of Science in Applied Data Science program represents a pure implementation of those recommendations by offering an applied, experiential-based program that results in a credential that leads to immediate gainful employment. Based on this research, the Master of Science in Applied Data Science program is a key component of our plan to grow enrollment to 1,200 students.

Growing enrollment in New College of Florida's <u>undergraduate</u> computer science, statistics, and data science programs also provide evidence of student demand for the Master of Science in Applied Data Science program. Since 2014, enrollment in undergraduate statistics, data science, and computer science courses has increased, on average, by 51% *per year* (where now more than 14% of all New College's Student Semester Hours are generated by courses in these areas). Over this same period of time, the number of students graduating with a concentration in statistics or computer science has increased an average of 71% per year (with 15% of our graduates now earning concentrations in Computer Science or Statistics). In only five years since it was established, New College of Florida's concentration in Computer Science can now claim to produce more graduates than any other concentration.



The interest and success of New College graduates in attaining graduate degrees in STEM fields also point to confidence in the projected enrollment of the Master of Science in Applied Data Science program. Within five years of earning their bachelor's degrees, 70% of New College of Florida graduates go on to enroll in graduate programs, with 44% earning a graduate degree in that period of time. National Science Foundation data show that since 2002, New College has ranked #1 among all public colleges and universities in producing graduates who go on to earn doctoral degrees in science and engineering (with an estimated 17% of New College students earning those STEM doctoral degrees within nine years of graduation). This means that New College has an available population of bachelor's degree recipients who are both interested in attending New College and interested in earning graduate degrees in STEM fields.

To take full advantage of our students' interest, the proposed Master of Science in Applied Data Science includes a 3+2 admissions option, an accelerated option in which students can complete both the Bachelor of Arts in Liberal Arts (in any area of concentration) and the Master of Science in Applied Data Science degrees within five years. Furthermore, we have recently introduced an undergraduate minor in data science designed to prepare students from humanities and social science majors with fundamental data science skills that will both prepare them for this proposed master's program and give them key skills desired by employers.

Appendix H provides additional evidence to support the number of New College graduates projected to enroll in the Master of Science in Applied Data Science program. Through a *Check-In Career Planning Survey* administered by NCF's Center for Career Engagement and Opportunity, New College gathers information on the post-graduation employment and enrollment goals of its graduating seniors. In each of the past four years, more than five graduating seniors have indicated a desire to attend a master's level program in Data Science. Through active recruitment of graduating seniors, New College conservatively projects the Master of Science in Applied Data Science program will enroll 5-6 New College graduates each year.

With its focus on developing skills that are in high demand throughout Florida, the Master of Science in Applied Data Science program is projected to attract 2-3 "additional in-state residents" each year. These students would be adults living in Florida who enroll full-time in the program to change careers or further enhance their career prospects. Financial incentives such as on-campus assistantships or project-based work and/or merit-based scholarships will also be available to this group of candidates to make the proposed program attractive for a career transition.

C. If substantially similar programs (generally at the four-digit CIP Code or 60 percent similar in core courses), either private or public exist in the state, identify the institution(s) and geographic location(s). Summarize the outcome(s) of communication with such programs with regard to the potential impact on their enrollment and opportunities for possible collaboration (instruction and research). In Appendix C, provide data that support the need for an additional program.

No public or private institutions in Florida currently offer master's level programs with the 11.0104 CIP code.

Programs in the same general area of study offered by private and public universities in Florida include:

- FAU's Master of Science in Data Science and Analytics program
- FIU's Master of Science In Data Science program
- FSU's Master of Science in Statistics with Major in Statistical Data Science program
- UCF's Master of Science in Data Analytics (Big Data) program
- UF's Master of Science in Information Systems and Operations Management program
- Embry-Riddle's Master of Science in Data Science program
- Jacksonville University's Master of Science in Applied Business Analytics program
- University of Miami's Master of Science in Business Analytics program

Although some of these programs require an introductory data science sequence and capstone project, New College of Florida's proposed Applied Data Science curriculum is not 60% similar in core courses to any of these programs.

In preparation for the CAVP pre-proposal approval meeting, BOG staff verified that no SUS institutions currently offered master's level programs with the 11.0104 CIP code. BOG staff also provided the following enrollment and degree completion data for master's level programs using the 30.3001 (Computational Science) CIP code:

			eg. ae			
		Enrollment		De	grees Award	ed
	2016	2017	2018	2017	2018	2019
FIU	0	8	23	0	0	1
FSU	8	8	7	6	10	4
UCF	15	33	50	0	12	18
SUS Total	23	49	80	6	22	23

SUS Master's Level Programs with CIP 30.3001 (Computational Science)

Although the 30.3001 CIP was identified by BOG staff as the most closely-related CIP code in the SUS, none of these programs are 60% similar in core courses to the proposed Master of Science in Applied Data Science program. The CAVP Academic Program Coordination review group did not foresee the proposed program competing with these existing programs, as the CAVP group raised no concerns when the pre-proposal was presented on September 24, 2020.

For the foreseeable future, the anticipated demand for graduates trained in data science (discussed in section II-A of this proposal) will greatly outpace the production of degrees in CIP 11.0104 (Informatics) and CIP 30.3001 (Computational Science). Appendix C provides an infographic showing the large and quickly growing shortage in trained data scientists in the U.S. The proposed Master of Science in Applied Data Science will contribute to, not compete with, building SUS capacity in this key area.

D. Use Table 1 - Appendix A (1-A for undergraduate and 1-B for graduate) to categorize projected student headcount (HC) and Full Time Equivalents (FTE) according to primary sources. Generally undergraduate FTE will be calculated as 30 credit hours per year and graduate FTE will be calculated as 24 credit hours per year. Describe the rationale underlying enrollment projections. If students within the institution are expected to change majors to enroll in the proposed program at its inception, describe the shifts from disciplines that will likely occur.

Table 1-B in Appendix A displays the projected growth in enrollment from 24 students in its first year to 52 students by the fifth year. Our confidence in these projections are based on student demand projections from a recently conducted market research study (discussed in section II-B of this proposal), enrollment and job demand growth across the U.S., and the growing enrollment in

undergraduate computer science, data science, and statistics courses within New College.

As presented in section II-B of this proposal, 70% of New College graduates go on to graduate school — and 44% earn at least one graduate degree — within five years. Furthermore, New College leads all public colleges and universities in the proportion of graduates who go on to earn doctoral degrees in science and engineering. As shown in Table 1-B, the proposed Master of Science in Applied Data Science program projects to enroll 5 New College graduates in the first year (with that number projected to grow to 12 by Year 5). While many of these students will come from New College's undergraduate computer science, statistics, and mathematics concentrations, we also anticipate attracting students graduating with concentrations within the humanities and social sciences. We expect the 3+2 program in which New College students can earn both a BA and MS in Applied Data Science in five years to be particularly attractive to our undergraduate students.

Appendix H provides additional evidence to support the number of New College graduates projected to enroll in the Master of Science in Applied Data Science program. Through a *Check-In Career Planning Survey* administered by NCF's Center for Career Engagement and Opportunity, New College gathers information on the post-graduation employment and enrollment goals of its graduating seniors. In each of the past four years, more than five graduating seniors have indicated a desire to attend a master's level program in Data Science. This supports the conservative projection of 5-6 New College graduates projected to enroll in the program each year (once we begin actively recruiting these students).

Market research conducted in 2019 suggests the Master of Science in Applied Data Science will attract undergraduates throughout Florida. For this reason, the program is projected to initially recruit and enroll 8 Florida students — 4 students graduating from other SUS institutions; 2 students from a private Florida university, and 2 additional in-state residents (adults looking to change careers). By the fifth year, that number will increase to 18 students per year. That same market research suggests we can anticipate enrolling 7 out-of-state students in the first year (which will grow to 16 students by the fifth year) in the Master of Science in Applied Data Science program.

Based on New College of Florida's undergraduate enrollment trends, Table 1-B shows the Master of Science in Applied Data Science is projected to enroll 4 international students in the first year and 6 international students by the fifth year. Longer-term, we see a great opportunity for rapidly increasing international student enrollment in the Master of Science in Applied Data Science.

The large and rapidly growing demand for trained data scientists — and New College's recent success in developing partnerships with local corporations — means the Master of Science in Applied Data Science program will also attract working adults looking to advance or change their careers. Individuals who choose to continue their current employment to advance their career may enroll in the program with their employers' support while working full-time or part-time. Others who are looking for a career change will be able to take advantage of financial incentives such as on-campus assistantships or project-based work and/or merit-based scholarships that are available to all candidates. Working collaboratively with New College of Florida's successful Center for Career Engagement & Opportunity, the proposed program will market itself to local employers and adult students. From these efforts, Table 1-B shows a projected enrollment of 3 individuals drawn from local agencies/industries in Year 1 and 6 individuals by Year 5.

The growth in FTE from 24.0 to 40.0 by Year 5 (displayed in Table 1-B) are calculated from the required credit hours in the proposed program. During the first year, each student is 1.00 FTE (completing 24 required credit hours). Students drop to 0.50 FTE in the second year as they complete 12 credit hours. Note that the proposed program still requires a full-time commitment for second-year students, as they will complete a full-time practicum with a corporate partner. While students will be working in the program full-time, we will only charge 12 credit hours of tuition in order to minimize the cost to the student.

E. Indicate what steps will be taken to achieve a diverse student body in this program. If the proposed program substantially duplicates a program at FAMU or FIU, provide, (in consultation with the affected university), an analysis of how the program might have an

impact upon that university's ability to attract students of races different from that which is predominant on their campus in the subject program. The university's Equal Opportunity Officer shall review this section of the proposal and then sign and date Appendix B to indicate that the analysis required by this subsection has been completed.

New College of Florida's 2020 Equity Report articulates the following baseline actions that are being taken to increase the diversity of our STEM programs:

- Recruit international students
- Provide support to begin a Women in Data Science group at New College
- Invite women speakers to present to students in natural science seminars
- Create a roundtable featuring women in STEM fields; connecting female program alumni with current students to share common experiences and ask questions
- Engaging with minority organizations in tech and STEM, encouraging students to participate, and recruiting from these organizations when appropriate

The proposed Master of Science in Applied Data Science is designed to enhance the diversity of the New College of Florida student body. In addition to the program attracting adult learners looking to change careers — a population that New College has historically not actively recruited — the program is designed to also attract and serve underrepresented student populations.

Throughout 2020-21, New College of Florida faculty, staff, and students actively participated in an Inclusive Campus Climate training initiative led by our Dean of Outreach and Chief Diversity Officer. This training jumpstarted initiatives to increase New College's outreach to underserved populations in the local community, to develop an equitable, inclusive learning environment, and to increase diversity among New College's students, faculty, and staff. These initiatives coincided with the use of grant funds to hire a Director of Community Outreach and a Financial Literacy Specialist; the search (current) for a Director of Diversity, Equity and Inclusion; and the launch of the Campus Climate and Culture Committee.

Building upon these initiatives and the expertise of recent hires, the Master of Science in Applied Data Science will take the following steps to achieve a diverse student body:

- Recruit and support a diverse faculty to teach and mentor students
- Actively recruit underrepresented student populations in the local community through collaboration with our Director of Community Outreach
- Aggressively recruit New College of Florida graduates, especially those from underrepresented populations
- Actively engage a diverse group of professionals and executives in the program's Advisory Board
- Foster partnerships with corporations to place students in inclusive practicum settings
- Monitor progress toward equity, access, diversity, and inclusion goals established in the College's annual Equity Report
- Engage students in national and international data science professional organizations and opportunities, such as Women in Data Science, StatFest, and diversity scholarships for professional meetings

The following features of the Master of Science in Applied Data Science program were intentionally designed to achieve a diverse student body:

- The program kicks off with a data science bootcamp in Year 1 pre-semester aimed at preparing students from diverse majors and backgrounds with the fundamental skills (eg. databases, python/R programming, main DS tools) commonly needed by all. Through this bootcamp, all students will learn that they are fully prepared for the program and that the program is designed to support their learning and development.
- The program's cohort model (in which groups of full-time students progress through the program together, made possible by the fact that the streamlined curriculum with no electives requires all students in each year of the program to participate in all of the same courses) and focus on team- and project-based learning will build a sense of community and inclusion among students.
- Students regularly attend Industrial Seminars delivered by professionals and executives from a variety of industries where data science projects are conducted. We will actively recruit a diverse group of professionals that will represent and serve as mentors for the

program's diverse student body.

Comparing enrollment in New College of Florida's successful and quickly-growing Computer Science concentration to national statistics (see the last two columns of the table below) demonstrates the success New College has had in attracting a diverse student body to data science fields. Whereas nationally, only 20% of computer science bachelor's degrees are awarded to female students, 39% of New College computer science graduates are female. Likewise, the percentage of underrepresented minorities graduating in computer science at New College slightly outpaces the percent nationally.

		Computer Science Bac	helor's Degree Recipients
	Data Science Jobs	U.S. (<u>NCES, 2018</u>)	New College of Florida
Female	11% ^(a)	20%	39%
Underrepresented Minorities*	6% ^(b)	31%	32%
African-American or Hispanic	10% ^(c)		18%

* Underrepresented minorities, as defined by Metis, include African Americans, Mexican-Americans, Native Americans (American Indians, Alaska Natives, and Native Hawaiians), Hispanic and Latino Americans, Pacific Islanders, and mainland Puerto Ricans

(a) <u>Metis, 2020</u>

(b) TowardsDataScience, 2020

(c) Metis, 2020

The diversity of New College of Florida's undergraduate computer science degree recipients is even more impressive when compared to data science as a field of employment. As the first column of the table above shows, females represent 11% of data scientists employed in the U.S. The proportion of data scientists from underrepresented minority populations is estimated to be extremely low, with one source estimating 10% of Data Scientists are African-American or Hispanic, while another source estimates underrepresented minority groups fill 6% of all Data Scientist positions. New College of Florida's success in recruiting, supporting, and graduating female and underrepresented minority computer science students indicates the proposed Master of Science in Applied Data Science could help improve the diversity of the data science field nationally.

The Master of Science in Applied Data Science program does not substantially duplicate any programs offered at FAMU or FIU.

III. Budget

A. Use Table 3 - Appendix A to display projected costs and associated funding sources for Year 1 and Year 5 of program operation. Use Table 4 - Appendix A to show how existing Education & General funds will be shifted to support the new program in Year 1. In narrative form, summarize the contents of both tables, identifying the source of both current and new resources to be devoted to the proposed program. (Data for Year 1 and Year 5 reflect snapshots in time rather than cumulative costs.)

Tables 3 (Budget) and 4 (Reallocation) in Appendix A display the projected costs and associated funding sources for years 1 and 5 of the proposed Master of Science in Applied Data Science program. Based on these projections, the proposed program will lower New College of Florida's overall cost per student and cost per degree produced.

As Table 3 in Appendix A shows, program costs fall into the following five categories to be funded through reallocated base E&G funds:

	Reallocated	Base (E&G)
	Year 1	Year 5
Faculty Salary and Benefits	\$328,500	\$427,500
USPS Salary and Benefits	\$25,000	\$50,000
Other Personnel Services	\$10,000	\$12,000
Expenses	\$48,500	\$58,500
Operating Capital Outlay	\$10,000	\$15,000
Total Costs	\$422,000	\$563,000
Cost per FTE	\$17,583	\$14,075

The \$328,500 in faculty salaries and benefits for Year 1 covers the cost of the seven participating faculty members listed in Table 2 (Faculty Participation) in Appendix A. In Year 1, this covers a full-time faculty program director and six faculty at 25% effort who will deliver first year courses. By Year 5, four of those six faculty members will increase their effort to 50% (to cover first and second year courses, plus student learning assessment, advising, placing students in practicums, and working with corporate partners.

In Year One, \$25,000 in USPS Salary and Benefits will be used to provide administrative support through a 0.50 FTE staff position. By Year 5, that position will increase to 1.00 FTE at \$50,000 to support the larger program by assisting in the coordination of marketing, admissions, and practicum placement efforts, and by serving as the program's fiscal and web liaison.

The Master of Science in Applied Data Science requires a minimal amount of funding for programmatic expenses, since base costs are shared with the undergraduate Computer Science program. The bulk of these recurring costs, estimated at \$68,500 in Year One (\$48,500 in general expenses; \$10,000 budgeted for OPS support; \$10,000 for Operating Capital Outlay), include technology hardware and software purchases, maintenance, and support (such as the server and database needs described in section X-B); program marketing and student recruitment expenses; and professional development expenses for faculty. The \$10,000 in OPS support is for IT services to maintain the computing infrastructure (e.g., servers, software, database management for the program) These costs align with the expenses of similarly sized academic units within New College.

As indicated in Table 3 in Appendix A, projected costs will be funded by reallocated base E&G funds (General Institutional Funds account 60901). Table 4 explains that each fiscal year, New College of Florida budgets funds toward general administrative costs. These are costs that have not been distributed as an administrative convenience, such as one-time payments for insurance, or employer costs such as unemployment taxes. For 2020-21, New College budgeted \$553,364 for these general administrative costs.

For 2021-22, \$422,000 will be reallocated from these general administrative costs to fund Year 1 of the Master of Science in Applied Data Science program. By Year 5, the \$563,000 in program costs will be funded through continuing base E&G funds.

Tuition and fee revenue will increase as the program grows from an initial enrollment of 24 (24.0 FTE) to 52 (40.0 FTE). The following table summarizes the tuition and fee charges anticipated for resident and non-resident students enrolled in Year 1 of the proposed program:

	Resident	Non-Resident
Tuition	\$398.13	\$398.13
Non-Resident Fee		\$662.04
Student Financial Aid Fee	\$19.90	\$19.90
Non-Resident Financial Aid Fee		\$33.10

Capital Improvement Fee	\$6.14	\$6.14
Activities & Service Fee	\$14.25	\$14.25
Health Fee	\$6.30	\$6.30
Athletic Fee	\$8.71	\$8.71
Technology Fee	\$19.90	\$19.90
Green Fee	\$1.00	\$1.00
Total per Student Credit Hour	\$474.33	\$1,169.47
Total tuition and fees for 36 credit hour program	\$17,076	\$42,101

The enrollment projections provided in Table 1-B (in Appendix A) allow for a projection of tuition and fee revenue generated by the proposed Master of Science in Applied Data Science program:

Tuition and Fees Generated	Year 1	Year 5
Resident	\$125,223	\$257,938
Non-resident	\$364,875	\$491,177
Total	\$490,098	\$749,115

Reserving 40% of tuition revenue for student financial aid (as discussed in section X-I of this proposal) results in the proposed Master of Science in Applied Data Science program generating just under \$300,000 in tuition revenue in the first year. By Year 5, the program is projected to generate almost \$450,000 in tuition revenue annually.

If enrollment and tuition revenues do not increase as projected, E&G funds from other College operations will be reallocated to support the program, and the Master's program expenses will be reduced to align with available revenues.

B. Please explain whether the university intends to operate the program through continuing education, seek approval for market tuition rate, or establish a differentiated graduate-level tuition. Provide a rationale for doing so and a timeline for seeking Board of Governors' approval, if appropriate. *Please include the expected rate of tuition that the university plans to charge for this program and use this amount when calculating cost entries in Table 3.*

New College does not intend to operate this program through continuing education, will not seek approval for market rate tuition, and will not establish a differentiated graduate-level tuition.

The expected rate of tuition and fees New College of Florida expects to charge for the Master of Science in Applied Data Science program is as follows:

	Resident	Non-Resident
Tuition	\$398.13	\$398.13
Non-Resident Fee		\$662.04
Student Financial Aid Fee	\$19.90	\$19.90
Non-Resident Financial Aid Fee		\$33.10

Total tuition and fees for program completion	\$17,076	\$42,101
Total per Student Credit Hour	\$474.33	\$1,169.47
Green Fee	\$1.00	\$1.00
Technology Fee	\$19.90	\$19.90
Athletic Fee	\$8.71	\$8.71
Health Fee	\$6.30	\$6.30
Activities & Service Fee	\$14.25	\$14.25
Capital Improvement Fee	\$6.14	\$6.14

At a total sticker price of \$17,076 (or \$42,101 for non-residents) and a projected starting salary of \$90,000 for program completers, New College of Florida will market this program as a tremendous value for students. The program is also an extremely cost-effective way for the State University System to produce highly-trained data scientists for Florida's innovation economy.

And that's assuming students pay full sticker price. Through private fundraising efforts, New College will work diligently to minimize the net cost to students for the Master of Science in Applied Data Science program. In budgeting for this program, we are assuming 40% of tuition revenue will be set aside for student financial aid.

C. If other programs will be impacted by a reallocation of resources for the proposed program, identify the impacted programs and provide a justification for reallocating resources. Specifically address the potential negative impacts that implementation of the proposed program will have on related undergraduate programs (i.e., shift in faculty effort, reallocation of instructional resources, reduced enrollment rates, greater use of adjunct faculty and teaching assistants). Explain what steps will be taken to mitigate any such impacts. Also, discuss the potential positive impacts that the proposed program might have on related undergraduate programs (i.e., increased undergraduate research opportunities, improved quality of instruction associated with cutting-edge research, improved labs and library resources).

The resources that will be needed for this program are already available at New College and will be reallocated to the proposed program. This includes faculty lines (recently hired to support growing enrollment in undergraduate computer science, statistics, and data science concentrations), administrative support, office and classroom space, IT infrastructure and services.

As originally planned in New College of Florida's 2016 Growth Proposal, alongside the development of undergraduate computer science and statistics concentrations, New College invested resources to integrate data analysis topics throughout its undergraduate curriculum. Because of these efforts, a significant portion of undergraduate student demand for data science related coursework can now be met through courses offered outside the traditional computer science and statistics programs. This allows faculty in these fields to shift a portion of their effort to support the proposed Master of Science in Applied Data Science program.

If this shift in effort begins to strain the capacity of the undergraduate courses, New College of Florida will hire additional faculty in these high-demand data science related programs.

There are significant positive impacts to the undergraduate program that will result from the creation of the Master of Science in Applied Data Science program. The applied nature of the program will equip masters students with the ability to engage in a more robust way with the undergraduate students related to data science. Many of the projects offered by the industrial partners of the proposed program are expected to require team effort, into which undergraduate students can be included. This will allow the UG students to engage with the program early in their program, get exposed to practical applications of data science and gain relevant and highly

competitive skills. The masters students will have a greater understanding of the subject matter because they have been exposed to practical aspects of the application of data science. The program will create additional opportunities for undergraduate research. We expect that some of the data science projects UG students are involved in will lead to opportunities for further research, potentially turning into senior theses. Graduate students may serve as tutors for such theses together with the thesis academic advisor because they have more domain knowledge and practical experience. Graduate students may also assist with tutoring of undergraduate students in the data science concentration. Last but not least, the masters program will also provide additional technology resources within the undergraduate concentration that can be used for student instruction and research.

Finally, we anticipate the 3+2 program option will enhance undergraduate student recruitment and help New College of Florida achieve its enrollment growth goals.

D. Describe other potential impacts on related programs or departments (e.g., increased need for general education or common prerequisite courses, or increased need for required or elective courses outside of the proposed major).

With its 3+2 option (see section VIII.D), the proposed Master of Science in Applied Data Science program is anticipated to generate additional demand for undergraduate statistics, data science, and computer science courses and programs. Much of this demand will be met through efforts to infuse data science throughout the New College undergraduate curriculum, including one-year course sequences such as Dealing With Data, a popular new sequence of courses aimed to ensure data literacy across the College.

The 3+2 option will lead to an increase in undergraduate FTIC and transfer student enrollment, as students will pursue both the Bachelor or Arts in Liberal Arts and Master of Science in Data Science degrees for a total of five years. We have already seen signs of student interest in this program in conversations with our current student body. New College of Florida is prepared to absorb an increase in undergraduate student demand.

E. Describe what steps have been taken to obtain information regarding resources (financial and in-kind) available outside the institution (businesses, industrial organizations, governmental entities, etc.). Describe the external resources that appear to be available to support the proposed program.

Since 2013, various interactions and collaborations established with the industry through internship and research programs in computer science, statistics and data science have been in place. Several companies and organizations, local, regional and national, who are strong proponents of data science, have provided opportunities for our students for summer internships and research projects. Many of these companies and their professionals and executives form the Advisory Board (see section VIII.F) we put together for the proposed program, from whom we also benefited greatly in terms of curriculum development. We anticipate that these relationships and collaborations will not only help improve the program on a continuous basis and keep it in sync with the expectations from industry, but will also continue to create opportunities for our students (in the new graduate program as well) in the form of more internships and projects.

Among the resources that will be provided and activities that will be supported by these organizations are:

- full-time paid practicum opportunity for a full-semester
- summer internship opportunity
- participation in the data science industrial seminar series as speakers
- providing data and participating in projects in one or more semester courses
- teaching modules in January during Industrial Workshops
- organizing additional workshops, data science bootcamps and certifications for our students
- spread the word about New College and its Applied Data Science program within their respective organizations and increase awareness

Below is a complete list of companies and organizations who have already collaborated with faculty and students at New College over the past several years. New College expects to continue working closely with most of these companies and organizations as the Master of Science in Applied Data Science program grows.

Adaorithmics Akamai Allen Brain Institute Ancestry.com Army Research Lab AventuSoft Bank of America Bar None Systems Bealls BlackRock Inc. Blue Cross Blue Shield Cienda Security City of Baltimore Clarifai Colchis Capital Connections Media CoreLogic Dendra

- **Distilled Analytics** Divers Alert Network Epic Systems FIS Global Florence A. Rothman Institute Gracenote Hughes Research Laboratories Intergreen USA Leidos Lexiflor LexisNexis Loggerhead Lovelace Respiratory Research Institute Lovepop Mind Research Network NASA Langley Research Center Ned Davis Research
- Novetta **NVIDIA** Perspecta PropLogix Prospect Bio Saatchi & Saatchi Wellness Sarasota Memorial Hospital SAS SiteSpect Stantec Consultancy Services Star2star **Teachers Pay Teachers** Ultimate Software UMass Amherst USGS Vencore Voalte W20

IV. Projected Benefit of the Program to the University, Local Community, and State

Use information from Tables 1 and 3 - Appendix A, and the supporting narrative for "Need and Demand" to prepare a concise statement that describes the projected benefit to the university, local community, and the state if the program is implemented. The projected benefits can be both quantitative and qualitative in nature, but there needs to be a clear distinction made between the two in the narrative.

Benefit to New College of Florida:

The proposed Master of Science in Applied Data Science program will help New College of Florida achieve two of its most important near-term goals: increasing student enrollment and reducing New College's total cost-per-degree.

In addition to the 52 students projected to enroll in the program by Year 5, the Master of Science in Applied Data Science program will boost undergraduate enrollment at New College. One way it will do this is by attracting undergraduate students to the 3+2 option, where students can earn both the Bachelor of Arts in Liberal Arts and Master of Science in Applied Data Science in five years. The proposed program will also boost undergraduate enrollment by enhancing the reputation of New College as a destination for students interested in a world class education that leads to immediate employment. These assertions are supported by recent growth in New College's undergraduate computer science and statistics courses and by recent market research conducted on behalf of New College of Florida.

By meeting the enrollment and cost projections detailed in this proposal, the Master of Science in Applied Data Science program will improve the efficiency of New College by reducing the College's overall cost-per-degree. Through tuition revenue and increased opportunities for federal and private funding, the proposed program will also provide additional revenue streams for New College.

Beyond these easily measurable benefits, the proposed program will advance New College's mission of preparing intellectually curious students for lives of great achievement. By building relationships with corporate partners, working collaboratively with an Advisory Board,

updating lab technology, and providing graduate students who can support undergraduates, the Master of Science in Applied Data Science program will have a positive impact on all undergraduate New College students. Continued growth in corporate partnerships — those who employ New College students as interns, supervise students in practicum experiences, or provide real datasets for students to analyze — will increase the impact New College has in its region and will improve New College's reputation. The program is also a perfect example of how New College is shifting its focus to infuse the world of work into its world-class liberal arts program (as described in New College of Florida's *Universities of Distinction* proposal).

Benefit to the local community:

Local economic development councils and employers decry the lack of trained data analysts in the area and maintain that national and international firms will not move here, despite the area's attractiveness, because of the scarcity of highly trained young people. The proposed Master of Science in Applied Data Science will attract talented students to the area and help retain some of the area's best baccalaureate graduates who currently leave the state. The program will also attract employees of national and international firms who live in the area to advance their careers. Finally, we believe that once the program is producing a steady supply of highly-skilled data scientists, the Master of Science in Applied Data Science program can help attract businesses to the Manatee-Sarasota area.

The proposed program will also help meet demand for research and service to local institutes and businesses. We have already had preliminary discussions of how this proposed program can interface with educational opportunities at Mote Marine Laboratory & Aquarium and Ringling College of Art & Design. Furthermore, through the work of the Advisory Board and the development of corporate partnerships, the reputation of the program will grow and attract more local businesses looking to New College for advice and support in building out their data science capacities.

Benefit to the State:

Graduates from the proposed Master of Science in Applied Data Science program will provide a direct economic benefit to Florida by filling difficult-to-find data scientist positions. With an anticipated median starting salary of \$95,000 (three times higher than Florida's per capita income), graduates from the proposed program will help fill some of the 80,000 highand middle-skilled STEM jobs left unfilled in Florida each month and contribute to Florida's tax base.

The State will also benefit from the talented, diverse resident and non-resident students the proposed program will attract, retain, and graduate. We believe the reputation this program will build will further solidify Florida's status as the number one state in the nation when it comes to higher education.

The proposed program will also provide nearly \$750,000 in direct economic benefits to Florida businesses through its practicum programs. By placing 25 students per year in the four-week, full-time Industrial Practicum I experience and 25 students per year in the fifteen week, full-time Industrial Practicum II course, New College of Florida will provide three-quarters of a million dollars in entry-level talent to Florida employers each year. We anticipate many of the corporations hosting our students in these practicums will go on to employ our graduates full-time, so these local businesses will also benefit through the ability to recruit difficult-to-find data scientists without incurring recruiting costs.

V. Access and Articulation – Bachelor's Degrees Only

A. If the total number of credit hours to earn a degree exceeds 120, provide a justification for an exception to the policy of a 120 maximum and submit a separate request to the Board

of Governors for an exception along with notification of the program's approval. (See criteria in Board of Governors Regulation 6C-8.014)

The proposed program is a Master's program, therefore this section is not applicable.

B. List program prerequisites and provide assurance that they are the same as the approved common prerequisites for other such degree programs within the SUS (see link to the Common Prerequisite Manual on <u>the resource page for new program proposal</u>). The courses in the Common Prerequisite Counseling Manual are intended to be those that are required of both native and transfer students prior to entrance to the major program, not simply lower-level courses that are required prior to graduation. The common prerequisites and substitute courses are mandatory for all institution programs listed, and must be approved by the Articulation Coordinating Committee (ACC). This requirement includes those programs designated as "limited access.

If the proposed prerequisites are not listed in the Manual, provide a rationale for a request for exception to the policy of common prerequisites. NOTE: Typically, all lower-division courses required for admission into the major will be considered prerequisites. The curriculum can require lower-division courses that are not prerequisites for admission into the major, as long as those courses are built into the curriculum for the upper-level 60 credit hours. If there are already common prerequisites for other degree programs with the same proposed CIP, every effort must be made to utilize the previously approved prerequisites instead of recommending an additional "track" of prerequisites for that CIP. Additional tracks may not be approved by the ACC, thereby holding up the full approval of the degree program. Programs will not be entered into the State University System Inventory until any exceptions to the approved common prerequisites are approved by the ACC.

The proposed program is a Master's program, therefore this section is not applicable.

C. If the university intends to seek formal Limited Access status for the proposed program, provide a rationale that includes an analysis of diversity issues with respect to such a designation. Explain how the university will ensure that Florida College System transfer students are not disadvantaged by the Limited Access status. NOTE: The policy and criteria for Limited Access are identified in Board of Governors Regulation 6C-8.013. Submit the Limited Access Program Request form along with this document.

The proposed program is a Master's program, therefore this section is not applicable.

D. If the proposed program is an AS-to-BS capstone, ensure that it adheres to the guidelines approved by the Articulation Coordinating Committee for such programs, as set forth in Rule 6A-10.024 (see link to the Statewide Articulation Manual on <u>the resource page for new program proposal</u>). List the prerequisites, if any, including the specific AS degrees which may transfer into the program.

The proposed program is a Master's program, therefore this section is not applicable.

Institutional Readiness

VI. Related Institutional Mission and Strength

A. Describe how the goals of the proposed program relate to the institutional mission statement as contained in the SUS Strategic Plan and the University Strategic Plan (see

link to the SUS Strategic Plan on the resource page for new program proposal).

- NCF Mission: New College of Florida prepares intellectually curious students for lives of great achievement. It offers a liberal arts education of the highest quality in the context of a small, residential public honors college with a distinctive academic program that develops the student's intellectual and personal potential as fully as possible; encourages the discovery of new knowledge and values while providing opportunities to acquire established knowledge and values; and fosters the individual's effective relationship with society.
- SUS Mission: The mission of the State University System of Florida is to provide undergraduate, graduate and professional education, research, and public service of the highest quality through a coordinated system of institutions of higher learning, each with its own mission and collectively dedicated to serving the needs of a diverse state and global society.

The Master of Science in Applied Data Science program will support the mission of New College in offering a liberal arts education that integrates knowledge and skills across the humanities, arts, natural sciences, social sciences, and information sciences. The Applied Data Science program aligns with the key goals of a liberal arts education — framing questions, working in teams, communicating results, and making ethical decisions — and data science as a discipline is widely recognized as a great fit with a liberal arts education (see, for example, <u>The Case for Data Science as the Modern Liberal Arts</u>; <u>Data Analytics and the Liberal Arts</u>; <u>Data Curiosity</u>; From Luxury to Necessity).

Data Science is highly interdisciplinary and hence opens a variety of opportunities for students studying their majors within a liberal arts context. Undergraduate students majoring in a certain discipline may be intrigued by our proposed program and can complement their skillset by taking graduate courses while pursuing interesting and diverse applications in their discipline. Graduate students who come from diverse undergraduate backgrounds may form project teams where they collaborate to address real-world problems with data science, using their complementary points of view in a liberals arts setting.

The Applied Data Science Masters program will be the first data science program utilizing the 11.0104 CIP. The program fits within the coordinated structure of the SUS system because no other SUS school has this program with the applied focus. Data science was ranked as the best job of 2017, 2018, and 2019 by Glass Door and currently has over 700 jobs available in Florida. This program will produce workforce ready graduates to fill a need in the state of Florida.

B. Describe how the proposed program specifically relates to existing institutional strengths, such as programs of emphasis, other academic programs, and/or institutes and centers.

The proposed Master of Science in Applied Data Science program builds upon New College of Florida's successful and quickly-growing undergraduate concentrations in computer science, statistics, and data science. In the six years since its inception, New College of Florida's undergraduate computer science concentration has grown to the point that one out of every seven New College graduates in 2020 completed a concentration in computer science. The proposed program aligns directly with New College's status as the #1 public college or university in the proportion of bachelor's degree recipients who go on to earn doctoral degrees in science and engineering.

The proposed program also aligns perfectly with New College of Florida's strategic plan, Universities of Distinction proposal, and recent market research. Synergies abound between applied data science and New College's strength in the liberal arts. Research activity in nearly every disciplinary and interdisciplinary program in the liberal arts and sciences generate data that can be analyzed and visualized to extract meaning. In focusing on applied liberal arts that lead directly to high-paying, in-demand jobs, the proposed program will increase enrollment and improve the College's reputation among potential students, the local community, and regional employers. Through its focus on providing practicum opportunities for students, this proposed program also aligns with the efforts of New College of Florida's Center for Career Engagement and Opportunity.

C. Provide a narrative of the planning process leading up to submission of this proposal. Include a chronology in table format of the activities, listing both university personnel directly involved and external individuals who participated in planning. Provide a timetable of events necessary for the implementation of the proposed program.

The roots of this program reach back to summer 2013, with the hiring of the first full-time Computer Science faculty member at New College of Florida. Growth in the undergraduate computer science program coincided with (and, therefore, influenced) major planning efforts for New College. For example, New College's 2016 Growth Proposal represented three months of intense collaboration among faculty, staff, and trustees (along with consultation with the Board of Governors staff).

With the legislature appropriating funding for the Growth Proposal, New College faculty worked throughout 2017-18 to identify disciplines in which to expand New College and its faculty body. From this work, faculty agreed upon key hires to make in computer science and statistics. This decision further expanded New College's undergraduate offerings in these key computer and information science disciplines.

Throughout 2018, New College engaged in a strategic planning process that led to the development of *Cultivating Curiosity*. *Unleashing Potential*. *The Strategic Plan for New College of Florida (2018-2028)*. A result of a year of focus groups and workshops involving faculty, staff, students, and Trustees, the Plan outlines strategies to increase collaboration with local employers and institutes and develop pathways to immediate employment upon graduation.

These strategies were implemented in a new undergraduate statistics concentration initiated in 2019-20. With the development of this program and the hiring of statistics faculty, New College reached a critical mass of faculty in computer and information sciences who were interested in developing a Master of Science in Applied Data Science.

This interest was further kindled with market research completed on behalf of New College in October 2019. The *New College of Florida - Institutional Strategy: Research, Modeling, and Consultation* market research report calls for New College to develop applied, experiential-based liberal arts programs that match the career interests of students and lead to immediate employment. Based on this research, faculty began to design a team-focused, experiential-based Master of Science in Applied Data Science program.

With program development underway, the New College Board of Trustees approved the 2020 Accountability Plan which calls for the creation of the Master of Science in Applied Data Science program. A program pre-proposal form was completed by faculty and staff and forwarded to the CAVP Academic Coordination Work Group for review. The CAVP Group raised no concerns.

To guide program development and strengthen the program proposal, Board of Governors staff hosted a training session for New College faculty and staff. Faculty also created a formal Advisory Board (consisting of professionals across the U.S.) who guided curriculum development and provided feedback. This consultation led to the development of this program proposal, a draft of which was discussed and endorsed by the New College Board of Trustees in October 2020.

Date	Participants	Planning Activity
Summer 2013	NCF faculty	New College of Florida hires its first Computer Science faculty member to begin an undergraduate concentration in computer science.
October 21, 2016	NCF faculty, staff, Trustees;	Following a series of workshops and meetings involving faculty, staff, Trustees, and Board of Governors staff, the New College Board of

Planning Process

	Board of Governors staff	Trustees approves the 2016 New College Growth Proposal which establishes a goal to reach 1200 students. The proposal notes New College's strength in producing STEM graduates and calls for a strengthening of graduate programs at New College.
January 2016	NCF faculty, staff; SACSCOC	SACSCOC approves a level change to allow New College to award masters degrees.
2017-18	NCF faculty, staff	New College faculty participate in a year-long series of workshops and planning sessions to identify new academic programs for development and disciplines in which to hire new faculty. These planning activities led to key hires in Computer Science and Statistics.
October 20, 2018	NCF faculty, staff, students, Trustees	The New College of Florida Board of Trustees approves <i>Cultivating</i> <i>Curiosity. Unleashing Potential. The Strategic Plan for New College</i> <i>of Florida (2018-2028).</i> The plan represents a year of focus groups and workshops involving faculty, staff, students, and Trustees. The Plan outlines strategies to increase collaboration with local employers and institutes and develop pathways to immediate employment upon graduation.
2019-20	NCF faculty	An undergraduate concentration in statistics is initiated. With this program, New College has reached a critical mass of faculty to develop and offer a Master of Science in Applied Data Science.
10/21/2019	NCF faculty, staff, students, alumni; prospective NCF students	The New College of Florida - Institutional Strategy: Research, Modeling, and Consultation market research report is published. This report calls for New College to develop applied, experiential-based liberal arts programs that match the career interests of students and lead to immediate employment.
Summer 2020	NCF faculty in computer science, statistics, and data science; NCF staff	Faculty design the proposed Master of Science in Applied Data Science program to align with NCF's Growth Proposal, Strategic Plan, and market research. Faculty develop the team-focused, experiential-based program, along with student learning outcomes, curricular requirements, and a budget model.
August 2020	NCF Board of Trustees	The NCF Board of Trustees approves the 2020 Accountability Plan which calls for the development of the Master of Science in Applied Data Science program.
September 24, 2020	CAVP Academic Coordination Work Group	The CAVP Academic Coordination Work Group reviews and discusses the program pre-proposal. The Group raises no concerns.
October 27, 2020	NCF staff, Trustees	The New College Board of Trustees approves NCF's Universities of Distinction Legislative Budget Request — <i>Educating for 21st Century</i> <i>Work</i> . The LBR articulates a plan to (a) close the skills gap so that all New College graduates acquire essential technical skills, credentials, and competencies needed to effectively fill jobs in Florida's fast changing economy; (b) place all New College students in internships, practicums, or hands-on service learning programs that are related to their career goals prior to graduation; (c) respond to regional workforce needs through the development of the New College Innovation Hub.
October 27, 2020	NCF Board of Trustees	New College Trustees discuss and endorse a proposal for a new Master of Science in Applied Data Science program to begin Fall 2021.
November 2020	NCF faculty; local and national employers	A formal Advisory Board is established for the proposed program. The Advisory Board provides feedback on the program curriculum.

Events Leading to Implementation

Date	Implementation Activity

February 11, 2021	NCF Board of Trustees considers approval of this program proposal.
February 11, 2021	Submission of the Request to Offer a New Degree Program to the Florida Board of Governors staff for review and approval
March 2021 (anticipated)	Florida Board of Governors considers approval of the program.
March 2021 (anticipated)	Program Director, Office of Enrollment Management, and Office of Marketing & Communications initiate student recruitment activities
March 2021 (anticipated)	Graduate Catalog submitted to Provost for approval
March/April 2021 (anticipated)	Marketing materials prepared and released
April 2021 (anticipated)	Course syllabi and assessment plans submitted to Graduate Coordinating Committee for review
April 2021 (anticipated)	Equipment purchased; classrooms reserved for Fall 2021
April 2021 (anticipated)	Hire faculty member for Data Science program
April 2021 (anticipated)	Faculty teaching assignments finalized
May 2021 (anticipated)	Convene Advisory Board
Summer 2021 (anticipated)	Program Director secures practicum placements for 2021-22
Summer 2021 (anticipated)	Program Director trains faculty and placement providers on program assessment activities
Fall 2021 (anticipated)	Program is fully implemented

VII. Program Quality Indicators - Reviews and Accreditation

Identify program reviews, accreditation visits, or internal reviews for any university degree programs related to the proposed program, especially any within the same academic unit. List all recommendations and summarize the institution's progress in implementing the recommendations. Please include evidence that teacher preparation programs meet the requirements outlined in Section. 1004.04, Florida Statutes, if applicable.

New College of Florida does not offer any programs with external, programmatic accreditation.

New College of Florida's undergraduate programs in the Natural Sciences are the most closely related to this proposed Master of Science in Applied Data Science program. The following table summarizes New College of Florida's response to recommendations from 2018 program reviews for our natural and physical science concentrations:

Recommendation	Response
New College should evaluate the effects of their grading system on admissions to the College and admissions of New College students to Medical School.	Faculty recently investigated and discussed the evaluation of student performance at a January 2021 Academic Affairs retreat. This included an in-depth discussion of evaluation systems that would produce a GPA for New College students.
We suggest that the Division formalize more joint programs between programs such as biophysics or computational science. In general throughout the Natural Science Division, there should be more joint programs between disciplines.	Interdisciplinary (joint) programs have become a focus for New College. The undergraduate statistics and data science concentrations (along with non-science programs, such as Health, Culture, and Societies and Quantitative Social Science) demonstrate New College's commitment to interdisciplinary programs.
The Division should develop a list of equipment replacement priorities that they advocate for each year such that replacement happens on a regular rotation.	Divisional budgets were supplemented with funds to cover regular equipment replacement.
We encourage the financial aid office and upper administration to investigate whether the amount of work study could be increased.	Since receiving this recommendation, New College of Florida increased efforts to raise funds for student financial aid and lowered the net cost of its undergraduate degree to an average of -\$2,000.
Continue to think about innovations in courses.	Funding for faculty professional development was

Rethink upper-level courses to be more creative and interdisciplinary.	increased. New College also strengthened encouragement for innovative teaching methods, team-taught courses, and student seminars.
Work with the Office of Admissions and Development at NCF to use data on student outcomes and students themselves for recruiting, marketing, PR, and fundraising. There is a disconnect between the excellence of the program and its visibility in the State of Florida and across the nation.	New College established a mission committee to work with marketing and communications in promoting the success of New College graduates. The College website was updated to focus more attention on student outcomes.

Internal assessment reports from New College's undergraduate computer science and statistics concentrations also provide recommendations for further program enhancement. Based on these reports, additional faculty were hired in these key areas to support growing student demand.

The proposed Master of Science in Applied Data Science program is designed to address many of the recommendations raised from these program reviews. For example, the program will have a traditional grading system that results in a GPA for every student. The program is also highly interdisciplinary in nature, integrating skills from mathematics, computer science, and statistics alongside content from a variety of disciplines and fields of employment. The program has also planned ahead to budget for student financial aid and focus on student employment opportunities and outcomes.

VIII. Curriculum

A. Describe the specific expected student learning outcomes associated with the proposed program. If a bachelor's degree program, include a web link to the Academic Learning Compact or include the document itself as an appendix.

The proposed Master of Science in Applied Data Science program is a master's level program and, therefore, does not produce an Academic Learning Compact.

Students graduating from the MS in Applied Data Science program will demonstrate the following learning outcomes as summarized under the following three main dimensions:

- 1. Foundational knowledge, domain knowledge and technical skills:
 - a. Explain fundamental principles and demonstrate foundational knowledge of
 - i. database systems; storage, retrieval and distribution of massive data sets
 - ii. algorithms and optimization
 - iii. data cleansing techniques and exploratory data analysis
 - iv. statistical modeling and computational techniques in statistical analysis
 - b. Describe the importance and role of data visualization in data analysis and construct effective data visualizations to communicate findings and results.
 - c. Develop and execute computer code for a data science pipeline using at least one widely acceptable programming language, and interpret results of the execution.
 - d. Demonstrate awareness and recognition of ethical, policy and legal issues arising in the use of large and individualized data sets
 - e. Construct and deliver data science pipelines

The following courses, workshops, and practicums, which constitute the proposed program, will be used to assess the foundational knowledge, domain knowledge and technical skills as listed above: Introduction to Data Science Bootcamp, Applied Statistics I and II, Algorithms for Data Science, Databases for Data Science, Data Munging and Exploratory Data Analysis, Data Visualization, Applied Machine Learning, Distributed Computing, Advanced Applied Statistics, Advanced Applied Computing, Practical Data Science, Industrial Workshops and Industrial Practicums I and II.

- 2. <u>Communication and teamwork skills</u>:
 - a. Interpret and evaluate, orally and in writing, the results of a data science investigation or analysis.
 - b. Communicate orally and in writing with audiences involved in the construction of a data product intended to inform an industry decision.
 - c. Effectively operate in a teamwork environment, communicate effectively with peers and team members

Communications and teamwork skills are assessed through course learning elements that include team projects or assignments, project presentations and report submissions as well as practical experience obtained in an internship or Practicum. The following courses will support this set of learning outcomes: Data Visualization, Applied Machine Learning, Distributed Computing, Practical Data Science and Industrial Practicums I and II.

- 3. <u>Practical experience</u>:
 - a. Apply foundational knowledge and technical skills accumulated throughout the program in one or more specific business domains to gain hands-on experience.
 - b. Through attending industrial seminars, demonstrate awareness and understanding of data science techniques applied and successfully used in a variety of business domains.

The learning outcomes under this category will be assessed through the two internship opportunities (Industrial Practicum I and II), Industrial Workshops and Industrial Seminar Series I, II and III.

The following matrix outlines which part of the curriculum will attempt to measure these learning outcomes (please refer to Section VIII.D and VIII.E for the full curriculum and course descriptions):

Learning Outcome	ADS 5000	ADS 5100	ADS 5110	ADS 5120	ADS 5130	ADS 5200	ADS 5210	ADS 5220	ADS 5230	ADS 6100	ADS 6120	ADS 6150	ADS 5190	ADS 5290	ADS 6190	ADS 5199	ADS 6910	ADS 6920
1.a.i	+		+		+				+									
1.a.ii				+				+			+							
1.a.iii	+		+															
1.a.iv		+				+				+								
1.b							+					+						
1.c				+							+	+						+
1.d												+				+		+
1.e												+						+
2.a							+					+						+
2.b												+						+
2.c								+	+			+					+	+
3.a																+	+	+
3.b													+	+	+			

Measurement of the above learning outcomes in the courses that are indicated in the matrix will be done in a variety of ways. Outcomes 1.a-1.e are intended to equip students with foundational knowledge and technical skills, therefore they will mostly be measured in regular coursework. For instance, the learning outcome on foundational knowledge related to database systems and storage and retrieval of massive datasets will be measured mainly in ADS 5130 Databases for Data Science and ADS 5230 Distributed Computing courses in the form of in-class examinations, homework assignments and team projects. Other courses will use similar measurement tools to

measure the learning outcomes 1.a-1.e. The final practical experience ADS 6920 Industrial Practicum II will also be a venue to measure part of 1.a-1.e, as most of these technical skills and knowledge play an important role in a successful internship.

Learning outcomes 2.a-2.c, which are primarily communication and teamwork skills, will be measured both in coursework and during practical experiences. Students participating in teamwork will be assessed based on their individual performance within the team as well as the team's overall performance. Students will also be expected to deliver presentations and written reports of their work, which will be subject to assessment. During their practical experience in ADS 6910 Industrial Practicum I and ADS 6920 Industrial Practicum II, rubrics will be completed by their company advisor(s) indicating how well the student demonstrates effective communication and teamwork skills within the environment they are working.

The final learning outcome 3, which is intended to equip students with practical experience in a company or organization, and give them exposure to a plethora of applications through industrial seminars will be measured separately for the two sub-outcomes. 3.a will be measured through a detailed rubric to be completed by each student's internship supervisor addressing various aspects of the student's knowledge and skills, and the student's performance in various assignments completed during the Industrial Workshops. 3.b will be measured through reflection papers to be completed by each student after each industrial seminar.

Upon approval of the proposed program, a Curriculum and Assessment Committee will be formed tasked with developing assessment rubrics for each learning outcome using an appropriate assessment scale (e.g. Likert scale). Each instructor of each relevant course will then be instructed to complete the rubric at the end of each semester, and the summarized overall performance will be shared with the stakeholders of the program.

B. Describe the admission standards and graduation requirements for the program.

Admission:

To be admitted to the Master of Science in Applied Data Science program, students will satisfy the following requirements:

- 1. Completion of a Bachelor's degree (except for 3+2 candidates; see below)
- 2. Demonstrated proficiency in elementary probability, statistics, linear algebra and programming through coursework in a Bachelor's program or other equivalent coursework

Candidates who satisfy these requirements will be expected to apply for admission during their senior UG year, though candidates in possession of their Bachelor's degrees will be able to apply at any time. In fitting with New College's holistic admissions processes that focus on the goals and achievements of each individual student, there will be no requirement for submitting a graduate admission test score (eg. GRE, GMAT) or a universal minimum undergraduate GPA standard. An Admissions Committee composed of faculty members and including the director of the program will review each application and make a decision to admit the candidate or not. The following documents will be taken into consideration in each candidate's application profile: a) post-secondary transcripts, b) letters of recommendation, c) recent employment or academic experience, d) GRE, GMAT or related test scores, e) proof of English language proficiency for non-native English speaking candidates, f) accreditation of diplomas and degrees from non-US colleges or universities. Upon the recommendation of the Admissions Committee, the program director will issue an acceptance letter to the successful applicants.

Candidates who are current students of NCF and would like to apply for admission through the 3+2 pathway (see Section VIII.D for the definition of 3+2 pathway) will be expected to complete the prerequisites of their application by the end of their 2nd year. These prerequisites include satisfactory completion of the following courses offered at NCF and being in good academic standing with the other undergraduate courses taken:

MATH 2400 Calculus I and MATH 3250 Calculus II

- CSCI 2200 Introduction to Programming in Python, or equivalent
- CSCI 3250 Intermediate Python Programming, or equivalent
- MATH 2200 Probability I and MATH 4550 Probability II
- MATH 2320 Linear Algebra

Upon completion of these courses and the recommendation of an NCF faculty member, the student will be required to submit their application no later than the end of the 4th semester of their undergraduate study. The application will be reviewed by the Admissions Committee and a provisional admission decision will be made, after which the student will be able to take graduate courses during the third and fourth years of their undergraduate program to be counted towards the MS degree. Once the student completes their 7th semester including all contract requirements of their undergraduate program and will be enrolled in the graduate program. This means these students will be almost entirely (except for the first two courses they take) associated with a single cohort in the program. If the student fails to complete the contract requirements of their undergraduate area of concentration by the end of their 7th semester, admission to the graduate program will be delayed until the beginning of the first Spring semester by which the student completes all requirements for New College of Florida's Bachelor of Arts degree.

Candidates who seek to transfer to the proposed program from another Master's level program in another institution will be required to submit, at the time of their application, all relevant graduate-level coursework previously taken and not counted towards earning a graduate degree. These candidates will be allowed to transfer no more than 12 SCH worth of coursework, and will be required to complete both Industrial Practicums during their term as a graduate student in the proposed program.

Graduation:

To graduate from the Master of Science in Applied Data Science program, all students will be required to satisfactorily complete

- 1. All credit and non-credit courses in the first and second years of the program as listed in sub-section C below.
- 2. Industrial Practicums I and II
- 3. Achieve a minimum 3.00 cumulative GPA by the end of the program

These graduation requirements will be further detailed in a Graduate Program Catalog, which will describe all procedures and regulations that are beyond the scope of this proposal. All components of the proposed curriculum are required; that is, there are no elective courses or other optional elements in the program. Students must complete all coursework, including the industrial practicums and workshops, listed in Section VIII.D successfully to graduate from the program.

C. Describe the curricular framework for the proposed program, including number of credit hours and composition of required core courses, restricted electives, unrestricted electives, thesis requirements, and dissertation requirements. Identify the total numbers of semester credit hours for the degree.

The proposed program requires completion of 36 total semester credit hours (SCH) of coursework, which includes 11 3-SCH courses, one 3-SCH and one 0-SCH industrial practicum courses, and five 0-SCH bootcamp/seminar/workshop courses. All courses are required, which are distributed to each of the four semesters as follows:

- Fall Pre-semester: one cours, 0 credit hours
- Fall 1: four courses, 12 SCH
- Interterm 1: one industrial workshops course, 0 SCH
- Spring 1: four courses, 12 SCH
- Summer or Interterm 2: industrial practicum I course, 0 SCH
- Fall 2: three courses, 9 SCH
- Spring 2: industrial practicum II course, 3 SCH

• Fall 1, Spring 1 and Fall 2: one industrial seminar course, 0 SCH

All components listed above are required. There are no restricted or unrestricted electives, nor thesis or dissertation requirements in the proposed program, as this framework is developed by design to maintain a tight cohort structure among students who enter the program at the same time, complete the same courses together and graduate together, creating strong ties that they will maintain during their professional careers.

Full details of the curriculum and course descriptions are given in Sections VIII.D and VIII.E.

D. Provide a sequenced course of study for all majors, concentrations, or areas of emphasis within the proposed program.

The proposed 2-year program will follow the semester schedule as shown below. All courses listed below are required courses and there are no elective courses in the program.

Year 1 Pre-Semester	SC H		
ADS 5000 Intro. to Data Science Bootcamp	-		
Year 1 Fall Semester (AugDec.)	SC H	Year 1 Spring Semester (FebMay)	SCH
ADS 5100 Applied Statistics I	3	ADS 5200 Applied Statistics II	3
ADS 5110 Data Munging & Exploratory Data Analysis	3	ADS 5210 Data Visualization	3
ADS 5120 Algorithms for Data Science	3	ADS 5220 Applied Machine Learning	3
ADS 5130 Databases for Data Science	3	ADS 5230 Distributed Computing	3
ADS 5190 Industrial Seminar Series I	-	ADS 5290 Industrial Seminar Series II	-
Year 1 Interterm (Jan.)	SC H		
ADS 5199 Industrial Workshops	-		
Year 1 Summer or Year 2 Interterm (Jan.)			
ADS 6910 Industrial Practicum I	-		
Year 2 Fall Semester (AugDec.)	SC H	Year 2 Spring Semester (FebMay)	SCH
ADS 6100 Advanced Applied Statistics	3	ADS 6920 Industrial Practicum II	3
ADS 6120 Advanced Applied Computing	3		
ADS 6150 Practical Data Science	3		
ADS 6190 Industrial Seminar Series III	-		
TOTAL	36		

Requiring all courses in the program is intentional by design and serves three main purposes:

- to maintain a tight cohort structure among students who enter the program at the same time, complete the same courses together and graduate together. This strengthens, on the part of students, the sense of belonging to the program and sharing its mission with the rest of the students in the same cohort. It also provides tight teamwork and networking opportunities, and the opportunity for them to maintain these ties beyond the duration of the program in their professional career.
- to help maintain a consistent level of quality and measurable outcomes from a program administration point of view.
- to increase efficiency and cost-effectiveness of the program

The program kicks off with a data science bootcamp in Year 1 pre-semester aimed at preparing students from diverse majors and backgrounds with the fundamental skills (eg. databases, python/R programming, main DS tools) commonly needed by all. Then in the first Fall semester, students take 4 fundamental data science courses, while also attending Industrial Seminars delivered by professionals and executives from a variety of industries where data science projects are conducted. In the Interterm in January, the students attend industrial workshops that cover complementary topics and areas in data science, such as ethics, domain-specific applications, industrial software platforms or tools. During the interterm, the students may also take professional certification modules and exams widely acknowledged in the industry. In the Spring semester, the students take 4 more courses, continue attending industrial seminars and complete their first year of studies.

During summer, before the second year Fall semester starts, students may complete a required internship. This requirement may also be fulfilled during the January interterm in their second year. This is a minimum 3-week part-time or full-time internship with at least 25 hours/week effort to be conducted at a company or organization on a data science related project, and it will fulfill a 0-credit S/U course (ADS 6910 - Industrial Practicum I) in the program requirements. All internships will be supervised by a designated faculty member who will ensure that certain program learning outcomes are achieved (see section VIII.A) with the help of the assessment that will be provided by a company supervisor. Practicum assessment rubrics are provided in Appendix I.

After the internship, the students will come back for the Fall semester to take 3 additional courses and attend more industrial seminars. In their final Spring semester, students will complete a second semester-long internship (full-time) in a company or organization, which will fulfill the requirements of the 3-credit ADS 6920 Industrial Practicum II course. This internship will not only provide students with an opportunity to put to practice all the knowledge and skills learned in the program, but will also set the groundwork for successful job placement, ideally in an industry or organization of their choice. This internship will be completed over 13 weeks of the Spring semester with 40 hours/week of full-time effort, and will also be supervised by a designated faculty member similar to ADS 6910. The faculty advisor will ensure that a more comprehensive set of program learning outcomes are achieved (see section VIII.A) again with input from a company supervisor who will complete an assessment of the student's practical experience (see practicum rubrics in Appendix I). With both practicums, students who are working adults/professionals will be able to have their company project work counted towards satisfying the practicum requirements provided that their project is not an already completed one and the assessment criteria are fulfilled.

As both industrial practicums are required components of the program, New College and the program administration will offer support in several ways to ensure students are successfully placed into relevant and strong internship programs. To this end, a main channel for student placement will be industrial partners who the College has relationships with and the members of the Advisory Board (see sections VIII.F and X.J). A second channel is the New College Center for Career Engagement and Opportunity (CEO) (<u>https://www.ncf.edu/ceo/</u>), which aims to connect all students across the campus with internship and employment opportunities available in and outside the campus. Finally, the program administration will seek long-term collaborations and agreements with select industry partners and companies that have a seat in the Advisory Board to ensure a stable number of internship positions available to the students of the program.

Several components of this curriculum are extremely critical in preparing students for a professional career in Data Science. While fundamental knowledge and technical skills are

delivered through rigorous coursework in the program, to be successful in industry in the field of data science students need opportunities to put their skills and knowledge into practice. The summer internship and the second full-time internship in the final Spring semester are intended to provide such an opportunity. The students also need to hear from visionary professionals about applications of Data Science, which will be accomplished through a 3 semester-long seminar series. Finally, the Industrial Workshops will allow students to complement their technical skills with many available tools and techniques that cannot be readily included in the regular courses of the program. All of these components and related activities will allow our students to start and maintain connections with industry professionals - networking opportunities that are critical for job placement and career development.

Undergraduate - Graduate Program Integration

An important aspect of the proposed program is its tight integration with the undergraduate programs at NCF. It is expected that many students majoring in a variety of areas will be interested in continuing into graduate education in data science, hence forming a sustainable and strong candidate pool for the proposed program. To facilitate this, we propose an alternative pathway into our proposed MS program. This would be a 3+2 track for undergraduate students enrolled at New College who would like to complete their undergraduate program followed by the proposed graduate program in a total of 5 years. According to this track design, the students, after satisfying certain prerequisites to get admitted, will take the MS program courses according to the following schedule:

3rd Year of UG program (Fall)	SC H		
ADS 5100 Applied Statistics I	3		
ADS 5110 Data Munging & Exploratory Data Analysis	3		
4th Year of UG program (Fall)	SC H	4th Year / 1st Grad Semester (Spring)	SCH
ADS 5120 Algorithms for Data Science	3	ADS 5200 Applied Statistics II	3
ADS 5130 Databases for Data Science	3	ADS 5210 Data Visualization	3
ADS 5190 Industrial Seminar Series I	-	ADS 5220 Applied Machine Learning	3
		ADS 5230 Distributed Computing	3
		ADS 5290 Industrial Seminar Series II	-
4th Year Interterm (Jan.)	SC H		
ADS 5199 Industrial Workshops	-		
4th Year Summer or 5th year Interterm			
ADS 6910 Industrial Practicum I	-		
5th Year Fall Semester	SC H	5th Year Spring Semester	SCH
ADS 6100 Advanced Applied Statistics	3	ADS 6920 Industrial Practicum II	3
ADS 6120 Advanced Applied Computing	3		

Schedule for 3+2 Undergraduate+Graduate Track

ADS 6150 Practical Data Science	3	
ADS 6190 Industrial Seminar Series III	-	
TOTAL	36	

Note that the courses listed above are in addition to courses that an NCF undergraduate student would normally take in their respective area of concentration.

To be eligible for entering the graduate program through this pathway, the students will be required to complete a set of prerequisite courses. These include Calculus I and II, Introduction to Programming in Python, Intermediate Python Programming, Probability I and II, and Linear Algebra, all of which can be taken during the first two years of the undergraduate program for any area of concentration. These prerequisites will also cover the topics addressed by the Introduction to Data Science Bootcamp course, which is normally offered in the Pre-semester of the proposed MS program. After completion of these prerequisites, the student's application for admission to the graduate program will be reviewed by the Admissions Committee and a provisional admission decision will be made (see Section VIII.B for the specific admission requirements and process).

The students who are interested in following this 3+2 track will complete their undergraduate program by the end of their 7th semester (Fall semester of 4th academic year) and will be considered to have graduated from the UG program assuming they have completed all requirements of their UG major successfully. They will then officially start the graduate program starting in the interterm of their 4th year followed by a full Spring semester of the graduate program.

The 3+2 track allows students to achieve a fast-track successive completion of the two programs, but equally important, it allows New College to <u>attract more students</u> starting at the UG freshman level aiming for this track as well as <u>transfer UG students</u> who wish to take advantage of this opportunity.

E. Provide a one- or two-sentence description of each required or elective course.

Note: All course numbers are subject to approval by the Statewide Course Numbering System

ADS 5000 - Introduction to Data Science Bootcamp (required for students entering by the Bachelor's Degree path) - 0 credit hours

The bootcamp aims to equip all students entering the graduate program with introductory skills and knowledge needed to conduct further coursework in the program. This will help students from diverse backgrounds to have a common knowledge base as a cohort. Topics will include review of Python and R programming, common data science tools, resources and platforms, operating systems, database concepts and systems, among others.

ADS 5100 - Applied Statistics I (required) - 3 credit hours

A statistics course focusing on descriptive and inferential statistics, with topics on linear regression, confidence intervals and hypothesis testing, including probability theory and modern approaches such as resampling, with all methods illustrated in R and a focus on methods relevant for data science using industrial datasets.

ADS 5110 - Data Munging and Exploratory Data Analysis (required) - 3 credit hours

A course on practical approaches for reshaping, reorganizing, and summarizing relationships in data through exploratory analysis. Principles and methods for preprocessing, normalizing, and validating data are covered, with an emphasis on collaborative and reproducible research.

ADS 5120 - Algorithms for Data Science (required) - 3 credit hours

Fundamentals of algorithms and measures of performance. Taught in Python, the course includes an exploration of efficient algorithms for sorting and retrieving data, graph algorithms and combinatorial optimization, dynamic programming, randomized algorithms and approximation algorithms.

ADS 5130 - Databases for Data Science (required) - 3 credit hours

Fundamentals of traditional database design and management. Various types and comparison of databases including SQL databases (eg. Postgre, SQLite), NoSQL databases, column-oriented databases (eg. HBase) and document-oriented databases (eg. MongoDb). Consistency, availability, scalability, efficiency and performance in data retrieval and storage.

ADS 5190 - Industrial Seminar Series I (required) - 0 credit hours

The first offering of a three-semester long seminar series which hosts professionals and executives as guest speakers from a variety of industrial domains. Each weekly or biweekly seminar covers topics and applications to diverse problems in business via applications of various data science techniques.

ADS 5199 - Industrial Workshops (required) - 0 credit hours

This course offers content modules complementary to the regular coursework of the graduate program in applied data science. Examples include, but are not limited to, topics such as Ethics, emerging or trending techniques in data science, domain-specific applications, industrial software platforms or tools, and professional certification modules and exams widely acknowledged in the industry.

ADS 5200 - Applied Statistics II (required) - 3 credit hours

A course on statistical modeling, including multiple linear and logistic regression, and more generally, generalized linear models. Emphasis is placed on model formulation, building, assumptions, interpretations, predictions and assessments, with implementation carried out in R and a focus on methods and models relevant for data science using industrial datasets.

ADS 5210 - Data Visualization (required) - 3 credit hours

A project-centered introduction to the visual display of quantitative information for both knowledge discovery and the communication of results. Students develop, over the course of the semester, a visual application in their interest with data collected from an industrial application or project.

ADS 5220 - Applied Machine Learning (required) - 3 credit hours

Project-based course with a coverage of supervised and unsupervised learning and an emphasis on working with real industrial data. Bayesian analysis and other specific learning paradigms including regression, clustering, random forests, support vector machines, kernel methods, and neural

networks.

ADS 5230 - Distributed Computing (required) - 3 credit hours

Fundamentals concerning the design and maintenance of massively parallel data sets. Non-relational databases and their management. Algorithms for parallel architectures and associated software tools including the MapReduce/Hadoop framework and BigTable.

ADS 5290 - Industrial Seminar Series II (required) - 0 credit hours

The second offering of a three-semester long seminar series which hosts professionals and executives as guest speakers from a variety of industrial domains. Each weekly or biweekly seminar covers topics and applications to diverse problems in business via applications of various data science techniques.

ADS 6100 - Advanced Applied Statistics (required) - 3 credit hours

A second statistical modeling course, with a mix of topics such as generalized additive models, models for longitudinal responses, time series models, survival analysis, statistical learning or Bayesian statistics, with a focus on models relevant for data science. Taught with a project-based focus using real industrial data in an applied business context.

ADS 6120 - Advanced Applied Computing (required) - 3 credit hours

Advanced topics in computing, including such topics as image processing and object detection, text mining, natural language processing, recurrent neural networks, reinforcement learning. Taught with a project-based focus using real industrial data in an applied business context.

ADS 6150 - Practical Data Science (required) - 3 credit hours

Analysis of data and creation of a data science pipeline and deliverable for industry. Working in small groups, students analyze an industry-submitted data set starting with exploratory analysis, followed by statistical or machine learning-based model building, and the construction and presentation of a data product to an industry partner.

ADS 6190 - Industrial Seminar Series III (required) - 0 credit hours

The third and final offering of a three-semester long seminar series which hosts professionals and executives as guest speakers from a variety of industrial domains. Each weekly or biweekly seminar covers topics and applications to diverse problems in business via applications of various data science techniques.

ADS 6910 - Industrial Practicum I (required) - 0 credit hours

Intended as a summer internship or interterm applied project, this course is the first extensive real industry experience opportunity offered to students who would like to put their data science knowledge and skills to practical use. Must be completed with an industrial partner of the program or a company/organization the student chooses to work with, while under the supervision of a data science faculty.

ADS 6920 - Industrial Practicum II (required) - 3 credit hours

A full semester working in industry as part of a data science team, while under the weekly supervision of and submitting reports to a Data Science faculty. This is the second and final stage of the industrial practicum where the student works in an industrial partner company or organization or in a company of their choice. Performance is assessed both by a faculty advisor and a company supervisor.

*Course numbers are subject to approval by the Statewide Course Numbering System (SCNS)

F. For degree programs in the science and technology disciplines, discuss how industry-driven competencies were identified and incorporated into the curriculum and indicate whether any industry advisory council exists to provide input for curriculum development and student assessment.

Our proposed Master of Science in Applied Data Science program and its curriculum reflect experiences gained at New College through faculty connections and collaborations with industry partners and professionals who have been active in computer science, data science and business analytics related projects and initiatives. As a result of many joint projects and initiatives with these industry partners conducted since 2014, the proposed curriculum has been distilled to provide our students the best possible graduate education and equip them with the right skills, practical training and industry-driven competencies.

One important aspect of any applied data science program is industry outreach and collaboration,

which leads to students having sufficient hands-on experience before joining the workforce. Many job postings in data science nowadays are for "senior" positions where the candidates are expected to demonstrate either job experience in this field at other organizations or a portfolio of data science projects with shared repositories of computer code or applications. The expectation by the industry is that candidates come already equipped with skills and experience as opposed to having them trained on-the-job. Our proposed curriculum with ample opportunities for practical industry experience and project-based learning with real industrial datasets addresses this expectation of the industry.

In addition to above, many new skills and competencies are expected within the domain of Deep Learning, a major sub-domain of Artificial Intelligence and Machine Learning. Our proposed program and curriculum encapsulate several partnerships, either started or in progress, with companies such as NVIDIA, IBM and SAS, that complement our curriculum with workshops, projects and certifications in collaboration with these organizations.

The proposed program is informed by an Advisory Board composed of industry leaders who have engaged in active and ongoing collaborations with NCF over many years. These professionals are not only prominent practitioners and executives in their respective companies and organizations in data science-related initiatives, they also actively contribute to and collaborate with NCF's programs, faculty, staff and students. Almost all of the components of the proposed program and its curriculum have been created and crystallized with input from the members of our Advisory Board.

The following is the list of members of the Advisory Board at the time of preparation of this proposal. The biography of each board member is included in Appendix F.

- 1. Ellen Belitzky, Ph.D. Business Intelligence Stream Leader, Danone North America
- 2. Joe Bungo Deep Learning Institute Program Manager, NVIDIA Corporation
- 3. Dan Camper LexisNexis Risk Solutions Group
- 4. Michael P. Crosby, Ph.D. President & CEO, Mote Marine Laboratory & Aquarium
- 5. Tom Grant Principal Analytical Training Consultant, SAS
- 6. Mulugeta Haile, Ph.D. U.S. Army Research Laboratory (ARL)
- 7. Michael Hawrylycz, Ph.D. Director, Informatics and Data Science, Allen Institute for Brain Science
- 8. Kevin Hunt Team Lead Data Scientist, Novetta, Inc., New College Alum
- 9. Roxie Jerde President and CEO, Community Foundation of Sarasota County
- 10. Beth Porter, Ph.D. CEO, Riff Analytics, Inc.
- 11. Vicki P. Raeburn Co-Founder and Chief Financial/Strategy Officer, Panartis Corp.
- 12. David Shrier Serial Entrepreneur and Corporate Innovator, Visionary Future, LLC.
- 13. Norman Worthington CEO, Star2Star Communications, New College Alum
- 14. Destin Wells VP of Business Development Services, Economic Development Corporation of Sarasota County
- 15. Ellis Wong Director of Engineering, Homesite Insurance

The Advisory Board will meet twice a year and review the program structure and curriculum, applicant and admitted student profiles, admission procedures and criteria, and job placement outlets and performance, and make recommendations on how to improve the program. In such a dynamic field as data science, the role of the Advisory Board is invaluable as it directly contributes to the program's relevance to the most recent advances in data science, machine learning and artificial intelligence, and the skills and knowledge expected thereof.

G. For all programs, list the specialized accreditation agencies and learned societies that would be concerned with the proposed program. Will the university seek accreditation for the program if it is available? If not, why? Provide a brief timeline for seeking accreditation, if appropriate. For degree programs in medicine, nursing, and/or allied health, please identify the courses that meet the requirements in Section 1004.08, Florida Statutes for required patient safety instruction.

New College is accredited by SACSCOC to offer academic programs at the master's level, which will cover the proposed program. There are currently no other specialized accreditation agencies or learned societies for academic programs in data science including the proposed MS program

in Applied Data Science. Currently, ABET only accredits master's level engineering and applied Natural Sciences programs. However, discussions are underway to start a new accreditation schedule for data science programs around the nation.

H. For doctoral programs, list the accreditation agencies and learned societies that would be concerned with corresponding bachelor's or master's programs associated with the proposed program. Are the programs accredited? If not, why?

The proposed program is not a doctoral program, hence this section is not applicable.

I. Briefly describe the anticipated delivery system for the proposed program (e.g., traditional delivery on main campus; traditional delivery at branch campuses or centers; or nontraditional delivery such as distance or distributed learning, self-paced instruction, or external degree programs). If the proposed delivery system will require specialized services or greater than normal financial support, include projected costs in Table 3 in Appendix A. Provide a narrative describing the feasibility of delivering the proposed program through collaboration with other universities, both public and private. Cite specific queries made of other institutions with respect to shared courses, distance/distributed learning technologies, and joint-use facilities for research or internships.

The delivery system for the proposed program will be a hybrid combination of traditional in-classroom face-to-face delivery on the New College campus and distance learning. As a result of the recent pandemic and measures taken to continue educational programs in its presence, New College has equipped a number of classrooms with lecture capture technology. All course material for the Master of Science in Applied Data Science Program will be subject to lecture capture and archived for use by students enrolled at New College with the intention of potentially distributing material across the SUS. Data associated with the program will be archived and a code repository will be built.

New College has been in contact with USF Sarasota-Manatee, State College of Florida and The Ringling College of Art and Design about the possibility of sharing computational and educational resources. The group of four institutions formed a consortium and has developed a plan which involves student cross registration at participating institutions. Students from consortium institutions as well as other students from within the SUS will be provided online access to archived video.

IX. Faculty Participation

A. Use Table 2 in Appendix A to identify existing and anticipated full-time (not visiting or adjunct) faculty who will participate in the proposed program through Year 5. Include (a) faculty code associated with the source of funding for the position; (b) name; (c) highest degree held; (d) academic discipline or specialization; (e) contract status (tenure, tenure-earning, or multi-year annual [MYA]); (f) contract length in months; and (g) percent of annual effort that will be directed toward the proposed program (instruction, advising, supervising internships and practica, and supervising thesis or dissertation hours).

As outlined in Appendix A Table 2, the proposed Master of Science in Applied Data Science Program will rely heavily on faculty resources already available at New College. The program will also leverage other resources including administrative support employees, and hardware and software inventory.

The faculty effort in general is determined based on the teaching demand in the program and the match between this demand and faculty teaching interests. While we have an initial idea of how each faculty can contribute to the proposed program by teaching which course(s), the exact faculty resource allocation will take place once the program is approved. Hence, the current figures in Appendix A Table 2 only reflect the aggregate calculation of FTE faculty needed to teach the proposed curriculum, assess student learning, evaluate program effectiveness, advise students, and place students into practicums.

B. Use Table 3-Appendix A to display the costs and associated funding resources for existing and anticipated full-time faculty (as identified in Table 2-Appendix A). Costs for visiting and adjunct faculty should be included in the category of Other Personnel Services (OPS). Provide a narrative summarizing projected costs and funding sources.

Table 3 in Appendix A summarizes the cost and funding structure for the proposed Master of Science in Applied Data Science program.

In Year 1, \$328,500 is budgeted for a full-time faculty program director and six faculty at 25% effort who will each deliver one first-year course (a headcount of 7 faculty representing 1.86 Person Years for the program). These costs will be funded by reallocated base E&G funds (General Institutional Funds account 60901). Table 4 explains that each fiscal year, New College of Florida budgets funds toward general administrative costs. These are costs that have not been distributed as an administrative convenience, such as one-time payments for insurance, or employer costs such as unemployment taxes. For 2020-21, New College budgeted \$553,364 for these general administrative costs.

From Year 1 through Year 5, faculty salary and benefits costs will increase to \$427,500 (as additional faculty FTE will be needed to deliver the entire two-year program). The costs are associated with four faculty members increasing their effort to 50% (with the 7 faculty now representing 2.63 Person Years for the program). These costs will be funded through continuing base E&G funds. Note that growing tuition revenue is projected to cover a large portion of program costs.

New College continuously seeks external funding through New College Foundation, which has proven to be effective in the past for certain funded projects conducted at the Natural Sciences Division in the data science domain. Several such projects in the past have provided funding for undergraduate and graduate students in research and teaching assistantship activities. We will continue to seek additional funding for the proposed program through this channel as well as from various granting agencies.

C. Provide in the appendices the abbreviated curriculum vitae (CV) for each existing faculty member (do not include information for visiting or adjunct faculty).

Curriculum Vitae have been provided in Appendix E.

D. Provide evidence that the academic unit(s) associated with this new degree have been productive in teaching, research, and service. Such evidence may include trends over time for average course load, FTE productivity, student HC in major or service courses, degrees granted, external funding attracted, as well as qualitative indicators of excellence.

Our proposed Master of Science in Applied Data Science program will draw resources and experience from the body of Computer Science, Mathematics and Statistics faculty who are housed in our undergraduate Natural Sciences Division. With the addition of 4 new Computer Science faculty and 2 new Statistics faculty in the last 5 years, with PhDs from prestigious universities, there is even more teaching and advising capacity now being offered by the Natural Sciences Division.

The following table shows growing undergraduate student interest and instructional productivity in Computer Science, Mathematics, and Statistics — the three fields foundational to data science:

Undergraduate Computer Science, Statistics, and Mathematics Enrollment, SSH, and

Dearees Academic Course % of SSH % of Degrees % of Year Enrollment total generated total awarded total 2015-16 1.090 13.4% 4.214 13.7% 12 7.1% 2016-17 1.108 13.7% 4.160 13.6% 10 6.1%
2017-18	1,309	16.3%	4,848	16.0%	16	9.1%
2018-19	1,210	16.4%	4,658	16.5%	27	12.7%
2019-20	1,053	16.5%	4,002	16.4%	29	15.8%

With the proportion of New College undergraduates earning degrees in Mathematics, Statistics, and Computer Science increasing to 16% in five years, these data suggest that a program in Applied Data Science is likely to have a significant interest and a healthy feed from the undergraduate population at New College.

We also note that being enrolled in an Honors college in Florida, many of our students seek postgraduate studies and have earned or are seeking MS and PhD degrees in such prestigious institutions as MIT, Stanford, Cal Tech, University of Chicago, University of Maryland and Carnegie Mellon. Others are employed by leading companies including Amazon, IBM, LexisNexis, Akamai, Ancestry, and American Express.

Recently, New College of Florida attracted external funding from MIT Sloan School of Management and Riff Analytics, to support research projects conducted by NCF students under the supervision of NatSci faculty members. The College also invested in additional computational resources including new GPU servers and support tech staff, which will increase the support and computational resources available to students studying in these disciplines. The College and Division also closely collaborate with world-renowned firms such as SAS, NVIDIA and IBM to further support our students' engagement with the industry.

Though New College is a teaching intensive institution, our faculty maintain impressive research programs, securing grants from the National Science Foundation and publishing in top ranked, peer reviewed journals. Examples include NSF grants earned by Dr. Roy, Dr. McDonald, Dr. Poimenidou and Dr. Kottke, Mellon Foundation EDGE grant earned by Dr. Poimenidou, Fulbright Scholarship by Dr. Klingenberg, four patents by Dr. Ryba and one patent by Dr. Gillman (please refer to curriculum vitae of faculty attached to this proposal for further details). The proposed Master of Science in Applied Data Science Program will move forward with such high-calibre faculty who are accomplished researchers, but, more importantly, dedicated to helping students succeed and contribute to this ever-growing field of data science. The New College faculty are very active in service, both to the profession, and to the local community.

X. Non-Faculty Resources

A. Describe library resources currently available to implement and/or sustain the proposed program through Year 5. Provide the total number of volumes and serials available in this discipline and related fields. List major journals that are available to the university's students. Include a signed statement from the Library Director that this subsection and subsection B have been reviewed and approved.

The sufficiency of the library and learning resources for the Data Science program was originally assessed by the Dean of the Library, the program director, and the Provost before the proposal to develop the Master's Program in Data Science was submitted to the Florida Board of Governors in September, 2014, and found satisfactory. The Director completed another review in October 2020 and found that the library does have resources currently available to implement and sustain the MS in Applied Data Science program.

- Print Monographs: The library owns 1,164 mathematics, computer science, and statistics print books that were published during the past five years.
- Electronic Monographs: The library licenses access to relevant ebooks through SpringerLink: 16,253 full text Computer Science books and 264 full text Statistics books, plus many more

online fulltext mathematics books.

- arXiv.org e-Print archive, which is an open e-print archive for physics, mathematics, and computer science.
- The IEEE Computer Society Digital Library (CSDL), a subset of the IEEE Xplore Digital Library, provides full text online access to over 520,000 IEEE Computer Society journal articles and conference papers.
- IEEE eBooks, which provides over 400 ebooks covering a variety of computer science and technology disciplines from 1974 to the present.
- Association for Computing Machinery digital library, which is a vast collection of citations and full text from ACM journal and newsletter articles and conference proceedings.
- Applied Science & Technology Full Text (H.W. Wilson/EBSCO), includes the latest findings in every area of science, engineering, and technology covering trade and industrial publications, journals issues by professional and technical societies, and specialized subject periodicals. Includes indexing and abstracts for nearly 800 core Englishlanguage scientific and technical publications dating back to 1983 full text from more than 220 journals as far back as 1992.
- JSTOR Mathematics and Statistics collection: This collection brings together over 500 titles in the mathematical and statistical sciences from existing JSTOR collections.
- MathSciNet is the American Mathematical Society's database, which contains over 3 million items and more than 1.8 million direct links to original articles in over 2000 journals from more than 250 publishers. Over 100,000 new items are added each year, most of them classified according to the Mathematics Subject Classification. Each year over 80,000 reviews are added, written by experts around the world. Reference lists are collected and matched internally from over 500 journals.
- ProQuest Computer Science Collection: Includes more than than 750 full text journals and 2 million indexed tables and figures and more than 4 million abstract & index records.
- Science Citation Expanded (8,500 of the world's leading scientific and technical journals across 150 disciplines) and Social Sciences Citation Index (Over 3,000 journals across 55 social science disciplines, as well as selected items from 3,500 of the world's leading scientific and technical journals), accessed via Web of ScienceTM Core Collection (Thomson Reuters).
- DataPlanet Statistical Datasets is a web-based research solutions tool that provides fast and easy access to data from licensed and public domain datasets within an easy-to-use interface. The DataPlanet repository contains more than 90 billion data points from more than 70 source organizations. The over two billion time series in DataPlanet provide immediate access to data presented in charts, maps, graphs, and table form, via multiple points of entry. There are up to 2 billion charts, maps, views, rankings, time series and tables available for use in the DataPlanet repository.
- B. Describe additional library resources that are needed to implement and/or sustain the program through Year 5. Include projected costs of additional library resources in Table 3-Appendix A. Please include the signature of the Library Director in Appendix B.

The proposed program will further need the following resources to be added to the library:

• one data server to host large digital datasets that will be used in classroom teaching,

class projects, and an annual data challenge to be hosted at New College.

 reassignment of 0.50 FTE library staff to support the maintenance of the above hardware and databases.

The cost of the data server has been included in the Table 3 Budget table in Appendix A.

C. Describe classroom, teaching laboratory, research laboratory, office, and other types of space that are necessary and currently available to implement the proposed program through Year 5.

The program requires two classrooms to accommodate the first and second year courses in the Fall semester, one classroom to accommodate the interterm period, and one classroom to accommodate the first year courses only in the Spring semester. This required space is already available and allocated for use with the proposed program through Year 5.

Similarly, the office space needed for the faculty who will teach in the proposed program is already available and allocated (since faculty teaching in the proposed program are already teaching undergraduate courses at New College of Florida).

The program also requires a server room, which is currently available.

D. Describe additional classroom, teaching laboratory, research laboratory, office, and other space needed to implement and/or maintain the proposed program through Year 5. Include any projected Instruction and Research (I&R) costs of additional space in Table 3-Appendix A. Do not include costs for new construction because that information should be provided in response to X (E) below.

The proposed program does not have any additional classroom space needs through Year 5.

E. If a new capital expenditure for instructional or research space is required, indicate where this item appears on the university's fixed capital outlay priority list. Table 3-Appendix A includes only Instruction and Research (I&R) costs. If non-I&R costs, such as indirect costs affecting libraries and student services, are expected to increase as a result of the program, describe and estimate those expenses in narrative form below. It is expected that high enrollment programs in particular would necessitate increased costs in non-I&R activities.

No new capital expenditure for instructional or research space is required.

F. Describe specialized equipment that is currently available to implement the proposed program through Year 5. Focus primarily on instructional and research requirements.

The proposed program will utilize the College's computing cluster consisting of five servers, which is available and in use by the undergraduate programs.

G. Describe additional specialized equipment that will be needed to implement and/or sustain the proposed program through Year 5. Include projected costs of additional equipment in Table 3-Appendix A.

As listed above, the following additional equipment will be needed to support the instructional activities through Year 5, which will be hosted at the library:

• one data server to host large digital datasets that will be used in classroom teaching, class projects, and an annual data challenge to be hosted at New College.

Additionally, the program will need the following specialized equipment to support students with their project implementations, in line with the greater applied focus of the program:

 three high-end multi-GPU servers to allow graduate students to implement and launch GPU-accelerated data science pipelines (one for first year students, one for second year students, and one for faculty research and/or internship/part-time projects).

H. Describe any additional special categories of resources needed to implement the program through Year 5 (access to proprietary research facilities, specialized services, extended travel, etc.). Include projected costs of special resources in Table 3-Appendix A.

The proposed program will require cloud services for applications that require storage space that exceed the capacity either already available or will be available via the new data server. The cloud services will also provide additional support for computational power and archiving video.

I. Describe fellowships, scholarships, and graduate assistantships to be allocated to the proposed program through Year 5. Include the projected costs in Table 3-Appendix A.

The proposed program will aim to attract high-calibre students from all disciplines who are highly qualified and motivated to pursue the proposed graduate program in applied data science. To support this mission, the administration will extend scholarships in the form of partial or full tuition waiver to such candidates, as it has done with students in other undergraduate/graduate programs at New College.

We anticipate through Year 5 that, on average per year per each student in an entering class, around 40% full tuition equivalent of scholarship offers may be extended. This amount may fluctuate over the years to adjust for the market dynamics.

Additionally, we anticipate that students in the program may take advantage of teaching assistantships to support undergraduate courses or the first-year graduate courses. The costs associated with these assistantships will be allocated from the budget of the division or program which the respective course is listed under.

J. Describe currently available sites for internship and practicum experiences, if appropriate to the program. Describe plans to seek additional sites in Years 1 through 5.

Internships and practicums will be a key component of the proposed program. Since 2015, some of the companies and organizations that have hosted our students in data science or STEM-related positions include:

Adgorithmics	Distilled Analytics	Novetta
Akamai	Divers Alert Network	NVIDIA
Allen Brain Institute	Epic Systems	Perspecta
Ancestry.com	FIS Global	PropLogix
Army Research Lab	Florence A. Rothman Institute	Prospect Bio
AventuSoft	Gracenote	Saatchi & Saatchi Wellness
Bank of America	Hughes Research Laboratories	Sarasota Memorial Hospital
Bar None Systems	Intergreen USA	SAS
Bealls	Leidos	SiteSpect
BlackRock Inc	Lexiflor	Stantec Consultancy Services
Blue Cross Blue Shield	LexisNexis	Star2star
Cienga Security	Loggerhead	Teachers Pay Teachers
City of Baltimore	Lovelace Respiratory Research	Ultimate Software
Clarifai	Institute	UMass Amherst
Colchis Capital	Lovepop	USGS
Connections Media	Mind Research Network	Vencore
CoreLogic	NASA Langley Research Center	Voalte
Dendra	Ned Davis Research	W20

With most of these organizations, our relationships continue to date, and due to successful graduate placements with most of them, they continue to offer internship and practicum positions to our students. We constantly work to pursue new organizations who could offer internships and practicum experiences. Some of the new arrivals include NVIDIA, SAS, IBM, Microsoft AI, Cigna. While we continue to discuss a variety of collaboration opportunities with these organizations, all of them have expressed interest in supporting our proposed program and its practical

components. We also actively seek other organizations where New College alumni are employed, who are usually willing to facilitate new initiatives and collaborations.

Appendix A Tables

Table 1-B Grad Enrollment Table 2 Faculty Participation Table 3 Budget Table 4 Reallocation

APPENDIX A TABLE 1-B PROJECTED HEADCOUNT FROM POTENTIAL SOURCES (Graduate Degree Program)

Source of Students (Non-duplicated headcount in any given year)*	Year 1 HC	Year 1 FTE	Year 2 HC	Year 2 FTE	Year 3 HC	Year 3 FTE	Year 4 HC	Year 4 FTE	Year 5 HC	Year 5 FTE
Individuals drawn from agencies/industries in your service area (e.g., older returning students)	0	0	0	0	0	0	0	0	0	0
Students who transfer from other graduate programs within the university**	0	0	0	0	0	0	0	0	0	0
Individuals who have recently graduated from preceding degree programs at this university	5	5	10	7.5	11	8.5	12	9	12	9
Individuals who graduated from preceding degree programs at other Florida public universities	4	4	8	6	8	6	8	6	8	6
Individuals who graduated from preceding degree programs at non-public Florida institutions	2	2	4	3	4	3	4	3	4	3
Additional in-state residents***	2	2	4	3	5	4	6	4.5	6	4.5
Additional out-of-state residents***	7	7	14	10.5	14	10.5	14	11	16	13
Additional foreign residents***	4	4	8	6	7	5	6	4.5	6	4.5
Other (Explain)***	0	0	0	0	0	0	0	0	0	0
Totals	24	24	48	36	49	37	50	38	52	40

* List projected annual headcount of students enrolled in the degree program. List projected yearly cumulative ENROLLMENTS instead of admissions.
** If numbers appear in this category, they should go DOWN in later years.
*** Do not include individuals counted in any PRIOR category in a given COLUMN.

Faculty Code	Faculty Name or "New Hire" Highest Degree Held Academic Discipline or Specialty	Rank	Contract Status	Initial Date for Participation in Program	Mos. Contract Year 1	FTE Year 1	% Effort for Prg. Year 1	PY Year 1	Mos. Contract Year 5	FTE Year 5	% Effort for Prg. Year 5	PY Year 5
А	Burcin Bozkaya, Ph.D.	Professor	Tenure	Fall 2021	12	1.00	0.75	0.75	12	1.00	0.75	0.75
	Data Science											
А	Andrey Skripnikov, Ph.D.	Asst. Prof.	Tenure-	Fall 2021	9	0.75	0.25	0.19	9	0.75	0.50	0.38
	Statistics		earning									
А	Bernhard Klingenberg, Ph.D.	Professor	MYA	Fall 2021	9	0.75	0.25	0.19	9	0.75	0.50	0.38
	Statistics											
А	David Gillman, Ph.D.	Assoc. Prof.	Tenure	Fall 2021	9	0.75	0.25	0.19	9	0.75	0.50	0.38
	Computer Science											
А	Tyrone Ryba, Ph.D.	Assoc. Prof.	Tenure	Fall 2021	9	0.75	0.25	0.19	9	0.75	0.25	0.19
	Biostatistics											
А	Matthew Lepinski, Ph.D.	Asst. Prof.	Tenure-	Fall 2021	9	0.75	0.25	0.19	9	0.75	0.25	0.19
	Computer Science		earning									
A	New Hire		Tenure-	Fall 2021	9	0.75	0.25	0.19	9	0.75	0.50	0.38
	Computer Science		earning									
	Total Person-Years (PY)							1.88				2.63

Faculty			PY	Workload by Budget Classifica	tion
Code	Code Description	Source of Funding	Year 1		Year 5
A	Existing faculty on a regular line	Current Education & General Revenue	1.69		2.25
В	New faculty to be hired on a vacant line	Current Education & General Revenue	0.19		0.38
С	New faculty to be hired on a new line	New Education & General Revenue	0.00		0.00
D	Existing faculty hired on contracts/grants	Contracts/Grants	0.00		0.00
E	New faculty to be hired on contracts/grants	Contracts/Grants	0.00		0.00
F	Existing faculty on endowed lines	Philanthropy & Endowments	0.00		0.00
G	New faculty on endowed lines	Philanthropy & Endowments	0.00		0.00
Н	Existing or New Faculty teaching	Enterprise Auxiliary Funds	0.00		0.00
	outside of regular/tenure-track line				
	course load				
		Overall Totals for	1.88		2.63

APPENDIX A TABLE 3 PROJECTED COSTS AND FUNDING SOURCES

Budget Line Item	Reallocated Base* (E&G) Year 1	Enrollment Growth (E&G) Year 1	New Recurring (E&G) Year 1	New Non- Recurring (E&G) Year 1	Contracts & Grants (C&G) Year 1	Philanthropy/ Endowments Year 1	Enterprise Auxiliary Funds Year 1	Subtotal Year 1	Continuing Base** (E&G) Year 5	New Enrollment Growth (E&G) Year 5	Other*** (E&G) Year 5	Contracts & Grants (C&G) Year 5	Philanthropy/ Endowments Year 5	Enterprise Auxiliary Funds Year 5	Subtotal Year 5
Faculty Salaries and Benefits	328,500	0	0	0	0	0	0	\$328,500	427,500	0	0	0	0	0	\$427,500
A & P Salaries and Benefits	0	0	0	0	0	0	0	\$0	0	0	0	0	0	0	\$0
USPS Salaries and Benefits	25,000	0	0	0	0	0	0	\$25,000	50,000	0	0	0	0	0	\$50,000
Other Personnel Services	10,000	0	0	0	0	0	0	\$10,000	12,000	0	0	0	0	0	\$12,000
Assistantships & Fellowships	0	0	0	0	0	0	0	\$0	0	0	0	0	0	0	\$0
Library	0	0	0	0	0	0	0	\$0	0	0	0	0	0	0	\$0
Expenses	48,500	0	0	0	0	0	0	\$48,500	58,500	0	0	0	0	0	\$58,500
Operating Capital Outlay	10,000	0	0	0	0	0	0	\$10,000	15,000	0	0	0	0	0	\$15,000
Special Categories	0	0	0	0	0	0	0	\$0	0	0	0	0	0	0	\$0
Total Costs	\$422,000	\$0	\$0	\$0	\$0	\$0	\$0	\$422,000	\$563,000	\$0	\$0	\$0	\$0	\$0	\$563,000

*Identify reallocation sources in Table 4.

**Includes recurring E&G funded costs ("reallocated base," "enrollment growth," and "new recurring") from Years 1-4 that continue into Year 5.

***Identify if non-recurring.

Faculty and Staff Summary

Total Positions	Year 1	Year 5
Faculty (person-years)	2.63	2.63
A & P (FTE)	0	0
USPS (FTE)	0	0

Calculated Cost per Student FTE

	Year 1	Year 5
Total E&G Funding	\$422,000	\$563,000
Annual Student FTE	24	40
E&G Cost per FTE	\$17,583	\$14,075

Table 3 Column Exp	lanations	
Reallocated Base* (E&G)	1	E&G funds that are already available in the university's budget and will be reallocated to support the new program. Please include these funds in the Table 4 – Anticipated reallocation of E&G funds and indicate their source.
Enrollment Growth (E&G)	2	Additional E&G funds allocated from the tuition and fees trust fund contingent on enrollment increases.
New Recurring (E&G)	3	Recurring funds appropriated by the Legislature to support implementation of the program.
New Non-Recurring (E&G)	4	Non-recurring funds appropriated by the Legislature to support implementation of the program. Please provide an explanation of the source of these funds in the budget section (section III. A.) of the proposal. These funds can include initial investments, such as infrastructure.
Contracts & Grants (C&G)	5	Contracts and grants funding available for the program.
Philanthropy Endowments	6	Funds provided through the foundation or other Direct Support Organizations (DSO) to support the program.
Enterprise Auxiliary Funds	7	Use this column for continuing education or market rate programs and provide a rationale in section III.B. in support of the selected tuition model.
Continuing Base** (E&G)	9	Includes the sum of columns 1, 2, and 3 over time.
New Enrollment Growth (E&G)	10	See explanation provided for column 2.
Other*** (E&G)	11	These are specific funds provided by the Legislature to support implementation of the program.
Contracts & Grants (C&G)	12	See explanation provided for column 5.
Philanthropy Endowments	13	See explanation provided for column 6.
Enterprise Auxiliary Funds	14	Use this column for continuing education or market rate programs and provide a rationale in section III.B. in support of the selected tuition model.

APPENDIX A TABLE 4 ANTICIPATED REALLOCATION OF EDUCATION GENERAL FUNDS*

Program and/or E&G account from which current funds will be reallocated during Year 1	Base before reallocation	Amount to be reallocated	Base after reallocation
General Institutional Funds - 60901 Each fiscal year, the College budgets funds towards general administrative costs; these costs have not been distributed as an administrative convenience. The amount listed represents the amount budgeted for 20-21. Examples of spending include one-time payments for insurance, and employer costs, such as unemployment taxes. For 21-22, these recurring costs will be reallocated via a cost allocation model.	553,364	422,000	\$131,364
	0	0	\$0
Totals	\$553,364	\$422,000	\$131,364

* If not reallocating E&G funds, please submit a zeroed Table 4

APPENDIX B

Please include the signature of the Equal Opportunity Officer and the Library Director.

h orlla ignature of Equal Opportunity Officer

2.

11/30/20 Date 10/19/20

Signature of Library Director

Date

This appendix was created to facilitate the collection of signatures in support of the proposal. Signatures in this section illustrate that the Equal Opportunity Officer has reviewed section II.E of the proposal and the Library Director has reviewed sections X.A and X.B.

APPENDIX C: Evidence of the need for additional Data Science programs



APPENDIX D — External Consultant's Report for Doctoral Programs

The proposed program is a Master's program, therefore this appendix is not applicable.

APPENDIX E — Curriculum Vitae

- Bozkaya, Burçin
- Eaton, Caitrin
- Eirini Poimenidou
- Gillman, David
- Hamid, Fahmida
- Klingenberg, Bernhard
- Kottke, Christopher
- Lepinski, Matthew
- McDonald, Patrick
- Roy, Tania
- Ryba, Tyrone
- Skripnikov, Andrey
- Yildirim, Necmettin

Burçin Bozkaya, Ph.D.

New College of Florida, Graduate Program in Data Science, 5800 Bay Shore Rd., Sarasota, FL, 34243 USA Phone: +1 941-487-4173 • Mobile: +1 301-697-7282 • E-Mail: bbozkaya@ncf.edu https://www.ncf.edu/directory/listing/burcin-bozkaya/

Education

Ph.D. in Management Science, University of Alberta, Canada	1999
Dissertation little: Political Districting: A labu Search Algorithm and Geographical Interfaces	1005
Thesis Title: A Spanning Tree Approach to Solving the Absolute p-Center Problem	1775
B.S. in Industrial Engineering, Bilkent University, Turkey	1993

Professional Experience

New College of Florida	, Data Science Graduate Program	n, Sarasota, FL, USA	Aug 2019 –

Director of Data Science (Sep. 2019 – present)

Responsible for program coordination, marketing, student recruitment, Practicum placement and other activities of the Data Science graduate program

NVIDIA Deep Learning Institute University Ambassador: taught DLI workshops on Computer Vision and Accelerated Deep Learning with RAPIDS

Professor of Data Science (Sep. 2019 – present)

Taught CAP 5323 Practical Data Science capstone course involving analytics on data provided by companies, using on-prem servers with NVIDIA GPUs and tools including RAPIDS, NVTabular, and NGC Docker containers

Responsible for student placement in and supervision during semester-long CAP 5940 Data Science Practicum

Conducting research on big data and behavior analytics, predictive analytics in finance, insurance and telecom; spatio-temporal modeling and analysis; transportation/logistics modeling and optimization; geographic information systems and decision support systems

Served as a Program Committee member:

- NERCCS 2020 Third Northeast Regional Conference on Complex Systems, Buffalo, NY, April 2020.
- ICCS 2020 Tenth International Conference on Complex Systems, Nashua, NH, July 2020.

Served as a Special Issue Guest Editor for Complexity: The Complexity of Mobility and Human Dynamics in Cities

Sabanci University, Sabanci Business School, Istanbul, Turkey

Network Faculty / Professor of Business Analytics (Sep. 2020 – present)

Conducting joint research with Behavioral Analytics and Visualization Lab faculty and graduate students on big data analytics; customer behavior analytics, predictive analytics and information visualization in finance, insurance, telecom and migration analysis

Co-supervising MS in Business Analytics thesis students, and Computer Science PhD and MS thesis students

Sep 2020 -





Professor of Business Analytics (Oct. 2016 – Aug. 2019)

Conducted research on big data analytics; customer behavior analytics and predictive analytics in finance, insurance and telecom; spatio-temporal modeling and analysis; transportation/logistics modeling and optimization; geographic information systems and decision support systems

Taught Business Analytics (UG, MS), Data Analytics (UG, MS), Management Science (UG, MBA), Operations Management (UG, MBA), Modeling in Excel (MBA, MS in Finance)

Organized the first workshop in Turkey on Business Analytics

Served as a Consultant and Key R&D Expert to industry projects on predictive analytics, optimization modeling, route scheduling, decision support systems design and implementation

Graduated 1 PhD student and 6 MS students; supervising 4 MS students

Program Committee Member for Challenges of Europe, 13th International Conference

Director, Behavioral Analytics & Visualization Lab (May 2015 – Aug. 2019)

Planned, managed and steered all activities of the Lab, co-founded by MIT Media Lab Human Dynamics Group, Sabancı University School of Management & Faculty of Engineering and Natural Sciences, and several Industry Partners

Coordinated data analytics research projects funded by TUBITAK (equivalent of NSF) and industry partners

Secured industry (banking, insurance, telecom, retail) research projects worth over \$2M

Exchanged 2 PhD students with MIT Media Lab; one of them was appointed with a post-doc position at MIT

Associate Dean (Sep 2013 – Mar 2018)

Responsible for teaching and research coordination, new program development, faculty performance evaluation, and overall promotion of the School of Management

Helped School of Management earn its AACSB re-accreditation in July 2017

<u>Sabanci MBA Program Director (Jan 2011 – Jan 2013)</u>

Responsible for program coordination, marketing, student recruitment and other activities of the MBA program

Established dual-degree collaboration with Zaragoza Logistics Center's ZLOG Master's program

Introduced and organized the first Company Action Project Award Competition

Associate Professor of Operations Management (Jun 2010 – Oct 2016)

Taught Operations Management, Business Analytics (UG), CRM & Location Intelligence (UG, MBA), Advanced Excel Modeling (MBA, MS in Finance), Programming in VBA for Excel (MBA, MS in Finance)

Conducted research on transportation/logistics modeling and optimization, location analysis, geographic information systems, and big data analytics

Designed and launched Business Analytics undergraduate minor program

Designed and launched M.Sc. in Business Analytics master's program

Designed and launched a new Ph.D. track on Business Analytics

Co-founded Behavioral Analytics & Visualization Lab with MIT Media Lab (May 2015)

Completed 1001 research project granted by TÜBİTAK (NSF of Turkey) Project Title: Exploring Value of Logistics Integrated Premium Services for the E-tailing Sector Completed research project granted by Istanbul Metropolitan Municipality ("Projem İstanbul") Project Topic: GIS Risk Analysis, Heatmap Visualization & DSS for Hazmat Transportation

Served as a Program Committee member:

- IEEE International Conference on Big Data, Washington, D.C., December 2016.
- IEEE International Conference on Big Data, Boston, December 2017.
- YA\EM 2016, 36th National OR/IE Conference, Izmir (also the Chair of Logistics Stream)
- YA\EM 2012, 32nd National OR/IE Conference, Istanbul (also Jury Member for Student Project Competition
- YA\EM 2010, 30th National OR/IE Conference, Istanbul

<u>Co-Director, IT in Management Master's Program (2005 – 2009)</u>

Member of team that developed new MS program and its curriculum

Served as a Co-Director for all activities (admission, marketing, day-to-day) of the program

Assistant Professor of Operations Management (Sep 2004 – May 2010)

Taught Operations Management (UG), Geographical Information Systems (UG), Managerial Decision Making (MS), Business Statistics (MBA & Exec. MBA), Programming in VBA for Excel (MBA)

Completed 1001 research project granted by TÜBİTAK (NSF of Turkey) Project Title: GIS-Based Analysis of Site Location and Logistics Problems using 3D Visualization

Served as an Organizing Committee member:

- ODYSSEUS 2009, 4th International Workshop on Freight Transportation and Logistics, Cesme, Turkey
- EUROMA 2007, 14th International EurOMA Conference, Ankara, Turkey

MIT Media Lab, Human Dynamics Group, Cambridge MA

<u>Visiting Professor</u>

Conducting research with Human Dynamics Group led by Prof. Sandy Pentland, using Big Data with economic models

Analyzing high-dimensional data sets with millions of bank transactions and customer demographics, Syrian refugee call data records, insurance premium contracts and points of interests

MIT Sloan School of Management & MIT Media Lab, Cambridge MA

International Faculty Fellow / Visiting Scholar

Conducted research with Media Lab Human Dynamics Group (Prof. Alex 'Sandy' Pentland) Research Theme: Using computational social science techniques on transaction data to analyze shopping behavior and financial well-being

Conducted research with MIT Sloan Operations Management Group (Prof. Stephen Graves) Research Theme: Desalination supply chain systems planning and optimization

VisioThink Information Technologies, Inc., Istanbul, Turkey

Founding Partner & Vice Chairman of the Board

Led a team that built location-based decision support software for spatial business intelligence, location analysis, vehicle tracking and transportation analysis for a major bank in Turkey

Designed various GIS visualization and mapping techniques including heat maps, risk maps, traffic density and noise maps

Jul 2018 – Jan 2019

Jan 2013 – Jun 2013

Apr 2006 – Apr 2018



3

4

Led a team that developed YAKAMOS, a GIS-based decision support system for visualizing and analyzing naval traffic risk and oil spills, for Denizcilik Mustesarligi, in collaboration with TÜBİTAK (NSF of Turkey)

Designed and launched VisioSuite.com, a GIS-based decision support system that offers various mapping services for SMEs, which was built using PHP and Javascript

Designed and launched TamNerede.com, a GSM-based Friend-finder web and mobile application used by over 250,000 Turkcell subscribers

Created a Geocoding (address locator) engine on Postgres for Turkish addresses, which includes parsing and matching algorithms

Served various clients in Finance, Telecom, Energy and Retail sectors with in-house developed, location-based decision support software

ESRI, Inc., Transportation & Logistics Services, Redlands, CA

Senior Operations Research Analyst

Technical lead for large-scale GIS logistics applications. Collected system requirements, designed system architecture, object modules and optimization algorithms

Designed and implemented

- an on-board navigation system for Sears technicians servicing homes
- a routing system for Motorola for measuring signal strength across the state grid
- a periodic routing and scheduling system for V.I.P.

ESRI, Inc., Transportation & Logistics Services, Redlands, CA

Analyst / Programmer

Developed an award-winning route optimization application for Schindler Elevator, for routing maintenance crews

Designed and implemented route optimization modules for various other logistics projects

Developed plug-ins and add-ons to ArcLogistics Route™, a COTS software product of ESRI

University of Alberta, School of Business, Edmonton, Canada

Research Assistant

Designed and implemented a GIS-integrated heuristic optimization algorithm for multi-objective political districting problem

Conducted research on heuristic solution techniques for various combinatorial optimization problems

Taught Environmental Operations Management course (UG)

Performed TA duties for Simulation and Distribution Planning courses

Designed prototype web site for School of Business Ph.D. Program

ESRI, Inc., Transportation & Logistics Services, Redlands, CA Summer 1996 Summer Intern Bilkent University, Dept. of Industrial Engineering, Ankara, Turkey 1993 - 1995

Graduate Assistant

1999 - 2001

2002 - 2004

1995 - 1998

Research Interests

Big Data Analytics and Machine Learning, Spatio-Temporal Analysis & Visualization, Location Analysis and Social Behavior, Routing and Logistics Optimization, GIS as a Decision Support Aid, Heuristic Algorithm Design and Heuristic Optimization for Combinatorial Problems, Districting / Territory Optimization, Location-Based Services

Teaching Interests

Business Analytics, Quantitative Analysis Techniques, Location Analysis, Quantitative Decision Making, Machine Learning, Statistics, Management Science, Database Management Systems, Excel and VBA Programming, C++ or C# Programming, Geographic Information Systems, Decision Support Systems, Heuristic Optimization

Awards

2019 Turk Telecom Data for Refugees (D4R) Challenge, Honorable Mention in Social Integration category

2014 Learning & Technology Conference, Best Paper Award

2010 CORS Practice Prize, Winner

2008 IEEE Best Paper Award

2002 INFORMS Franz Edelman Finalist Award

1998 Government of Alberta Graduate Fellowship

Publications in Refereed Journals

Suhara, Y., Bahrami, M., Bozkaya, B. and A. Pentland (2021) Validating Gravity-Based Market Share Models Using Large-Scale Transactional Data, *Big Data*, forthcoming.

Cinar, A., Salman, F.S. and B. Bozkaya (2021) Prioritized Single Nurse Routing and Scheduling for Home Healthcare Services, European Journal of Operational Research, 289(3), 867-878.

Kaya, E., Alpan, E., Balcisoy, B. and B. Bozkaya (2020) Quantifying Insurance Agency Dynamics Using Premium Sales Big Data and External Factors, *Big Data*, https://doi.org/10.1089/big.2020.0049

Ak, R., Bahrami, M. and B. Bozkaya (2020) A time-based model and GIS framework for assessing hazardous materials transportation risk in urban areas, *Journal of Transport & Health*, https://doi.org/10.1016/j.jth.2020.100943

Dong, X., Morales, A.J., Jahani, E., Moro, E., Lepri, B., Bozkaya, B., Sarraute, C., Bar-Yam, Y. and A. Pentland (2020) Segregated interactions in virtual and physical space, *EPJ Data Science*, doi 10.1140/epjds/s13688-020-00238-7

Chong, S.K., Bahrami, M., Chen, H., Balcisoy, S., Bozkaya, B. and A. Pentland (2020) Economic outcomes predicted by diversity in cities, *EPJ Data Science*, 9(17), doi 10.1140/epjds/s13688-020-00234-x

Koseoglu, B., Kaya, E., Balcisoy, S. and B. Bozkaya (2020) ST sequence miner: Visualization and mining of spatiotemporal event sequences, *The Visual Computer*, doi 10.1007/s00371-020-01894-6

Bahrami, M., Bozkaya, B. and S. Balcisoy (2020) Using Behavioral Analytics to Predict Customer Invoice Payment, *Big Data*, 8(1), 1-13, doi.org/10.1089/big.2018.0116



Dong, X., Jahani, E., Morales, A.J., Bozkaya, B., Lepri, B. and A. Pentland (2020) Purchase Patterns, Socioeconomic Status, and Political Inclination, *The World Bank Economic Review*, 34, S9-S13

Yanik, S., Kalcsics, J., Bozkaya, B. and S. Nickel (2019) A Multi-Period Multi-Criteria Districting Problem Applied to Primary Care Scheme with Gradual Assignment, International Transactions in Operational Research, 26(5), 1676-1697.

Tuna, M., Bozkaya, B., Döğerlioğlu-Demir, K. and C. Koçaş (2018) Market Segmentation Based on Big Data: Examining Consumer Shopping Mall Diversity and Product Category Diversity Behaviors through Credit Card Transactions, Studies on Marketing Insights, 2(2), 57-68

Kaya, E., Dong, X., Suhara, Y., Balcisoy, S., Bozkaya, B. and A. Pentland (2018) Behavioral Attributes and Financial Churn Prediction, *EPJ Data Science*, 7:41, doi 10.1140/epjds/s13688-018-0165-5

Yucel, E., Salman, S., Bozkaya, B. and C. Gokalp (2018) A Data-Driven Optimization Framework for Routing Mobile Medical Facilities, Annals of Operations Research, doi 10.1007/s10479-018-3058-x

Urkup, C., Bozkaya, B. and S. Salman (2018) Customer Mobility Signatures and Financial Indicators as Predictors in Product Recommendation, *Plos One*, doi 10.1371/journal.pone.0201197

Dong, X., Meyer, J., Shmueli, E., Bozkaya, B. and A. Pentland (2018) Methods for Quantifying Effects of Social Unrest using Credit Card Transaction Data, *EPJ Data Science*, 7:8, 10.1140/epjds/s13688-018-0136-x

Dong, X., Suhara, Y., Bozkaya, B., Singh, V.K., Lepri, B. and A. Pentland (2018) Social Bridges in Community Purchase Behavior, ACM Transactions on Intelligent Systems and Technology, 9(3), 1-29

Bozkaya, B., Salman, S. and K. Telciler (2017) An Adaptive and Diversified Vehicle Routing Approach to Reducing the Security Risk of Cash-in-Transit Operations, *Networks*, 69(3), 256-269

Emec, U., Catay, B. and B. Bozkaya (2016) An Adaptive Large Neighborhood Search for an E-grocery Delivery Routing Problem, Computers & Operations Research, 69, 109-125

deKervenoael, R., Yanik, S., Bozkaya, B., Palmer, M. and A. Hallsworth (2016) Trading-up on unmet expectations? Evaluating consumers' expectations in online premium grocery shopping logistics, International Journal of Logistics-Research and Applications, 19(2), 83-104

Singh, V.K., Bozkaya, B. and A. Pentland (2015) Money Walks: Implicit Mobility Behavior and Financial Wellbeing, *Plos One*, doi 10.1371/journal.pone.0136628

Kilci, F., Kara, B.Y. and B. Bozkaya (2015) Locating Temporary Shelter Areas after a Large-Scale Disaster, European Journal of Operational Research, 243(1), 323-332

Al-Nory, M.T., Brodsky, A., Bozkaya, B. and S.C. Graves (2014) Desalination Supply Chain Decision Analysis and Optimization, *Desalination*, 347, 144-157

Yanik, S., Bozkaya, B. and R. deKervenoael (2014) A New VRPPD Model and a Hybrid Heuristic Solution Approach for E-Tailing, European Journal of Operational Research, 236(3), 879-890

Aktas, E., Ozaydin, O., Bozkaya, B., Ulengin, F. and S. Onsel (2013) Optimizing Fire Station Locations for Istanbul Metropolitan Municipality, Interfaces, 43(3), 240-255

Bozkaya, B., Erkut, E., Haight, D. and G. Laporte (2011) Designing New Electoral Districts for the City of Edmonton, Interfaces, 41(6), 534-547

deKervenoael, R., Kocoglu, I., Yanik, S. and B. Bozkaya (2011) E-Market Tedarik Zincirinde Direncin Kırılması: E-Perakende, Lojistik ve Kentsel Planlama İşbirliği, Pazarlama ve Pazarlama Araştırmaları Dergisi, Haziran 2011

Sezgin, Y., Kasap, N. and B. Bozkaya (2010) A Conceptual Model for Assessing Managerial Implications of Changes in Information Technologies, *Doğuş University Journal*, 11(2), 257-268



Bozkaya, B., Yanik, S. and S. Balcisoy (2010) A GIS-Based Optimization Framework for Competitive Multi-Facility Location-Routing Problem, Networks and Spatial Economics, 10(3), 297-320

Ozturan, E. H., M. Oral, N. Kasap and B. Bozkaya (2008), Information Technology and Business Awareness Diagnostic Tool, European Journal of Management, Fall 2008

Blakeley, F., B. Bozkaya, B. Cao, W. Hall and J. Knolmajer (2003) Optimizing Periodic Maintenance Operations for Schindler Elevator Corporation, Interfaces, 33 (1), p. 67-79

Bozkaya, B, E. Erkut and G. Laporte (2003) A Tabu Search Heuristic and Adaptive Memory Procedure for Political Districting, *European Journal of Operational Research*, 144, p. 12-26

Erkut, E. and B. Bozkaya (1999) Analysis of Aggregation Errors for the p-Median Problem, Computers and Operations Research, 26 (10-11), p.1075-1096

Bozkaya, B. and B.C. Tansel (1999) A Spanning-Tree Approach to the Absolute *p*-Center Problem, *Location Science*, 6 (1-4), *p*.83-107

Books

Bozkaya, B. and V.K. Singh (2015) Geo-Intelligence and Visualization through Big Data Trends (pp. 1-348). Hershey, PA: IGI Global. doi 10.4018/978-1-4666-8465-2

Proceedings

Boz, H.A., Bahrami, M., Suhara, Y., Bozkaya, B. and S. Balcisoy (2020) An Exploratory Visual Analytics Tool for Multivariate Dynamic Networks. Proceedings of the 2020 EuroVis Workshop on Visual Analytics, K. Vrotsou and C. Turkay (Eds), 19-23, doi 10.2312/eurova.20201081

Bahrami, M., Findik, Y., Bozkaya, B. and S. Balcisoy (2018) Twitter Reveals: Using Twitter Analytics to Predict Public Protests. Proceedings of NERCCS 2018: The First Northeast Regional Conference on Complex Systems, Binghamton, NY, April 2018

Kaya, E., Toka, M., Bayrak, A., Bozkaya, B. and S. Balcisoy (2015) Incorporating Tabletop Visual Analytics into the Decision-Making Process: A Case Study of Retail Banking, *Proceedings of IEEE Business Visualization 2015*

Book Chapters

Gurkan, M., Bozkaya, B. and S. Balcisoy (2021) Financial Datasets: Leveraging Transactional Big Data in Mobility and Migration Studies, to appear in Salah, A.A. and E.E. Korkmaz (Eds.) Data Science for Migration and Mobility Studies, Oxford University Press.

Yanık, S. and B. Bozkaya (2020) A Review of Districting Problems in Health Care, Ch.3 in Rios-Mercado, R.Z. (Ed.) Optimal Districting and Territory Design: Models, Algorithms, Springer, pp. 31-55

Bozkaya, B., Bruno, G. and I. Giannikos (2019) Location and Geographic Information Systems, Ch.19 in G. Laporte, S. Nickel and F. Saldanha-da-Gama (Eds.), *Location Science*, 2nd edition, Springer, Cham, pp. 559-590

Bakker, M.A., Piracha, D.A., Lu, P.J., Bejgo, K., Bahrami, M., Leng, Y., Balsa-Barreiro, J., Ricard, J., Morales, A.J., Singh, V.K., Bozkaya, B., Balcisoy, S. and A. Pentland (2019) Measuring fine-grained multidimensional integration using mobile phone metadata: the case of Syrian refugees in Turkey, Ch.3 in Salah, A.A., Pentland, A., Lepri, B., Letouze, E. (Eds.), *Guide to Mobile Data Analytics in Refugee Scenarios : The 'Data for Refugees Challenge' Study*, Springer, Cham



Basar, A., Kabak, O., Topcu, Y.I. and B. Bozkaya (2015) Location Analysis in Banking: A New Methodology and Application for a Turkish Bank, Ch. 2 in Eiselt, H.A., Marianov, V. (Eds.), *Applications of Location Analysis*, Springer, Cham, pp. 25-54

Bozkaya, B. (2015) Teaching Operations Management Using Hands-On Educational Tools and Interactive Games, Ch. 11 in Sultan, N., Al-Lail, H.J. (Eds.), Creative Learning and MOOCs: Harnessing the Technology for a 21st Century Higher Education, Cambridge Scholars, pp. 151-159

Srivastava, K.A., Singh, V.K., Bozkaya, B. and A. Pentland (2015) Assessing Financial Well-Being of Merchants by Analyzing Behavioral Patterns in Historical Transactions, Ch. 3 in Bozkaya B., Singh, V.K. (Eds.), Geo-Intelligence and Visualization through Big Data Trends, IGI-Global, pp. 76-93

Turk, A., Balcisoy, S. and B. Bozkaya (2015) An Interactive Tool for Visualizing and Analyzing Spatio-Temporal Data, Ch. 5 in Bozkaya B., Singh, V.K. (Eds.), Geo-Intelligence and Visualization through Big Data Trends, IGI-Global, pp. 121-149

Cao, B. and B. Bozkaya (2012) Vehicle Routing in Service Industry using Decision Support Systems, Ch. 13 in Faulin, J., Juan, A.A., Grasman, S.E., Fry, M.J. (Eds.), Decision Making in Service Industries: A Practical Approach, CRC Press, Boca Raton, pp. 303-334

Bozkaya, B., Cao, B. and K. Aktolug (2011) Routing Solutions for the Service Industry, in Montoya-Torres, J.R., Juan, A.A., Huatuco, L.H., Faulin, J., Rodriguez-Verjan, G.L. (Eds.), Hybrid Algorithms for Service, Computing and Manufacturing Systems: Routing and Scheduling Solutions, IGI Global, pp. 46-78

deKervenoael, R., Bozkaya, B. and M. Palmer (2011) Online Grocery Provision Resistance: Understanding Urban (Non) Collaboration and Ambiguous Supply Chain Environments, in Kamna, M., Choudhary, P.K. (Eds.) Business Organizations and Collaborative Web: Practices, Strategies and Patterns", IGI Global Publishing, New York, pp. 120-143

Bozkaya, B., Zhang, J. and E. Erkut (2001) An Efficient Genetic Algorithm for the p-Median Problem, Ch. 6 in Facility Location: Applications and Theory, Z. Drezner and H.W. Hamacher (Eds.), Springer, Berlin, pp. 179-205

Manuscripts Under Review

Bahrami, M., Findik, Y., Bozkaya, B. and S. Balcisoy. Twitter Reveals: Using Twitter Analytics to Predict Public Protests, revised and resubmitted to *Plos One*

Tuna, M., Bozkaya, B., Dogerlioglu-Demir, K. and C. Kocas. Challenging the Interchangeability of Diversity (Variety Seeking) and Loyalty Behaviors in Market Segmentation: A Synthesis Using Big Data, revised and resubmitted to Journal of Retailing and Consumer Services

Buda, G., Bozkaya, B. and C. Kocas. Extraction and Analysis of Out-of-Town Trips' Purposes Using Credit Card Transaction Data, under review by *Tourism Economics*

Work in Progress

Netto, C.F.S., Bahrami, M., Brei, V.A., Bozkaya, B., Balcisoy, S. and A. Pentland. Gravitational Sales Estimation

Telciler, K., Bozkaya, B. and S. Salman. Spatio-Temporal Expenditure Forecasting for Bank Customers using Transactional Data

Gencyurek, O.C., Buyukcan-Tetik, A. and B. Bozkaya. The Big Five Personality Traits as Predictors of Financial Wellbeing: A Big Data Approach

Ozaydin, O., Cekyay, B., Isik, M., Ulengin, F., Kabak, O., Ekici, S.O., Toktas-Palut, P., Bozkaya, B. and I. Topcu. A simulation-based approach for improving the largest border crossing between Europe and Turkey



Findik, Y., Boz, H.A., Bozkaya, B. and S. Balcisoy. Introducing Assistive Analytical Agent for Decision Making in Exploratory and Collaborative Visual Analytics Sessions

Castrillo, F.P., Dong, X., Bozkaya, B. and A. Pentland. Signatures for exploration and exploitation behaviour in consumer mobility patterns

Recent Presentations

Bozkaya, B. and M. Bahrami. Understanding Social and Economic Impact of the Outbreak using Mobility Data, COVID-19: An Interdisciplinary Approach to the Understanding of a Pandemic course offered at New College of Florida (September 2020).

Bozkaya, B., Netto, C.F.S., Bahrami, M., Brei, V., Balcisoy, S. and A. Pentland. Gravitational Forecasting Reconciliation: Sales prediction without historical data, LOD 2020 – The Sixth International Conference on Machine Learning, Optimization and Data Science (July 2020)

Bozkaya, B., Brei, V., Netto, C.F.S., Bahrami, M., Balcisoy, S. and A. Pentland. Gravitational Forecasting Reconciliation: Sales prediction without historical data, MIT Connection Science Trusted Data (March 2020)

Bozkaya, B., Chong, S.K., Bahrami, M., Chen, H., Balcisoy, S. and A. Pentland. Exploring Drivers for Economic Growth Using Mobility and Transactional Data, Challenges of Europe 2019, Bol, Croatia (May 2019)

Bozkaya, B., Bahrami, M., Suhara, Y., Chong, S.K., Chen, H., Balcisoy, S. and A. Pentland. Human Mobility Networks: Using Gravity Models to Explain Food Foraging Behavior and More, NetSci 2019, Burlington, VT (May 2019)

Suhara, Y., Bahrami, M., Bozkaya, B. and A. Pentland. A Gravity Model of Market Share Based on Transaction Records, INFORMS Business Analytics Conference, Baltimore, MD (Apr 2018)

Cinar, A., Bozkaya, B. and S. Salman. Prioritized Routing and Scheduling for Home Healthcare Services, VeRoLog 2017, Amsterdam, The Netherlands (Jul 2017)

Bahrami, M., Bozkaya, B. and S. Balcisoy. Using Predictive Analytics to Learn and Predict Customer Invoice Payment Behavior, IC²S² 2017, Cologne, Germany (Jul 2017)

Alpan, E., Gokturk, G., Balcisoy, S. and B. Bozkaya. Insurance Fraud Detection: A Network Modeling and Behavioral Analytics Approach, IC²S² 2017, Cologne, Germany (Jul 2017)

Yanik, S, Kalcsics, J., Bozkaya, B. and S. Nickel, A Multi-Objective Districting Approach for Designing the General Practitioners' (GP) Scheme, EURO 2016, Poznan, Poland (Jul 2016)

Dong, X., Jahani, E., Morales, A.J., Bozkaya, B., Lepri, B. and A. Pentland. Purchase Patterns, Socioeconomic Status, and Political Inclination, Annual Bank Conference on Development Economics 2016, Washington, DC (Jun 2016)

Adebayo, J., Suhara, Y., Singh, V.K., Bozkaya, B. and A. Pentland. Forecasting Financial Well-Being for Small and Medium Enterprises Using Network-Based Signals, 2016 International Conference on Computational Social Science, Evanston, IL (Jun 2016)

Service

Special Issue Guest Editor for Complexity: The Complexity of Mobility and Human Dynamics in Cities

Program Committee Member for IEEE Graph Computing 2020, Irvine, CA, Sep 2020

Program Committee Member for ICCS 2020, Nashua, NH, July 2020



Program Committee Member for NERCCS 2020, Buffalo, NY, April 2020 Program Committee Member for IMISC 2019, Istanbul, Turkey, Oct 2019 Program Committee Member for IEEE Graph Computing 2019, Laguna Hills, CA, Sep 2019 Program Committee Member ICCS 2018, Cambridge, MA, Jul 2018 Program Committee Member for IEEE International Conference on Big Data, Boston, MA, Dec 2017 Program Committee Member for IEEE International Conference on Big Data, Washington, DC, Dec 2016 Program Committee Member and Logistics Stream Chair for YA\EM 2016, Izmir, 2016 Program Committee Member and Student Project Competition Jury Member for YA\EM 2012, Istanbul, 2012 Program Committee Member for YA\EM 2010, Istanbul, 2010 Organizing Committee Member for Odysseus 2009 Conference, Cesme, May 2009 Organizing Committee Member for EurOMA 2007 Conference, Ankara, Jun 2007

Miscellaneous

Citizen of Canada and Turkey.

Languages: English (fluent), Turkish (native), German (introductory), Italian (introductory) Enjoy musical performance, marathon running, triathlon, skiing, hiking, and playing bridge

Caitrin Eaton | CV

ceaton [AT] ncf.edu

Division of Natural Sciences New College of Florida 5800 Bay Shore Rd Sarasota, FL 34243

Expertise

Bio-informed robotics • Embedded systems • Computational physiology • Machine learning • Interdisciplinary collaboration • Support of diverse learning styles • Experiential education

Education

- 2017 Postdoc, Muscle Physiology & Mechanics Lab, University of California, Irvine
- 2015 PhD, Computer Science & Engineering, University of South Florida
- 2009 BS, Computer Engineering, Tufts University

Research Experience

- 2020-Pres. Principal investigator, *Computational Physiology Lab, New College of Florida*. Computational physiology and biologically informed robotics, focusing on passive dynamics in locomotion and emergent properties in complex systems of simple mechanical units.
- 2017-2020 Principal investigator, *Colby College Computational Physiology & Optimization (C3PO) Lab.* Designed synthetic tendon for legged robots and modeled the emergent properties of muscle as a function of contractile protein geometry.
- 2015-2017 Postdoctoral research fellow, *Muscle Physiology and Mechanics Lab, Dept of Ecology & Evolutionary Biology, University of California, Irvine.* Embedded systems for real-time interaction with animals and live tissues, machine learning applied to the analysis of physiological datasets, and computational modeling of musculotendon systems on subcellular and organismal scales.
- 2009-2015 Doctoral research assistant, *Biomorphic Robotics Laboratory, Dept of Computer Science & Engineering, University of South Florida.* Morphological and algorithmic design of biologically inspired legged robotic systems, covering the full design cycle from modeling and prototyping to test and verification.
- 2006-2007 Undergraduate research assistant, *Human Factors Research Group, Dept of Mechanical Engineering, Tufts University.* Haptic environments for laparoscopic surgery simulation.

Teaching Experience

Assistant Professor - New College of Florida

- 2021 Spr CSCI2300 Introduction to Computer Systems, Architecture, & Digital Hardware
- 2021 Spr CSCI2400 Object-Oriented Programming

- 2020 Fall CSCI3377 Machine Learning for Visual Thinkers
- 2020 Fall CSCI3250 Intermediate Python

Assistant Professor - Colby College

- 2020 Spr CS251 Data Analysis and Visualization
- 2020 Spr CS152 Computational Thinking: Scientific Applications
- 2019 Fall CS232 Computer Architecture
- 2019 Fall CS152 Computational Thinking: Scientific Applications
- 2019 Spr CS442 Computational Physiology
- 2019 Spr CS151 Computational Thinking: Visual Media Applications
- 2018 Fall CS342 Embedded Systems
- 2018 Fall CS153 Computational Thinking: Smart Systems
- 2018 Spr CS251 Data Analysis and Visualization
- 2018 Spr CS152 Computational Thinking: Scientific Applications (Lab)
- 2018 Spr CS151 Computational Thinking: Visual Media Applications (Lab)
- 2017 Fall CS151 Computational Thinking: Visual Media Applications
- 2017 Fall CS152 Computational Thinking: Scientific Applications (Lab)
- 2017 Fall CS231 Data Structures (Lab)

Instructor of Record - University of South Florida

- 2014 Fall Microprocessor Interfacing
- 2014 Sum Microprocessor Interfacing
- 2013 Sum Data Structures

Other

- 2012-2017 Calculus, computer science, and physics tutor specializing in support for disparate learning styles Wyzant Tutoring, Tampa, FL and Irvine, CA
- 2011-2012 Engineering outreach mentor Upward Bound, Tampa, FL

Industry Experience

2008-2009 Multi-agent robotics – Draper Laboratory, Cambridge, MA
2008 Radar open systems architecture – MIT Lincoln Laboratory, Lexington, MA

Publications

** undergraduate co-author * graduate co-author

Peer Reviewed Articles

- 2019 **CE Eaton**, T Ramdhoni^{**}, and RS Karp^{**}. Exploring structural control of stiffness in synthetic tendon. *CLAWAR 2019: 22nd International Conference on Climbing and Walking Robots and the Support Technologies for Mobile Machines*, pp. 26-33. clawar.org/conference-proceedings
- 2019 C Reynaga, **CE Eaton**, G Strong**, and E Azizi. Compliant substrates disrupt elastic energy storage

in jumping tree frogs. *Integrative and Comparative Biology*, 59 (6), 1535-1545. Oxford University Press.

- 2017 E Azizi, AR Deslauriers, NC Holt, **CE Eaton**. Resistance to radial expansion limits muscle strain and work. *Biomechanics and modeling in mechanobiology*, 16, no. 5 (2017): 1633-1643. doi.org/10.1007/s10237-017-0909-3
- 2016 LR Palmer III, K Ashley**, and **CE Eaton**. Optimized Energy Addition for a Planar SLIP Model with Redundant Joints. In *IEEE/RSJ International Conference on Intelligent Robots and Systems* (*IROS*)), pp. 3399-3405. IEEE, 2016. doi.org/10.1109/IROS.2016.7759523
- 2014 LR Palmer III and **CE Eaton**. Periodic spring-mass running over uneven terrain through feedforward control of landing conditions. *Bioinspiration & Biomimetics*, 9(3):036018. doi.org/10.1088/1748-3182/9/3/036018
- 2012 LR Palmer III and **CE Eaton**. Toward innate leg stability on unmodeled and natural terrain: Quadruped walking. In *Proc. of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pp. 2775–2780. doi.org/10.1109/IROS.2012.6386187
- 2004 D Brown, R Barter, R Buck, **C Eaton**, B Mason, M Pratt. Multiplayer Online Gaming and Its Increasing Impact on High School Age Students. In *Proc. of E-Learn: World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education*, pp. 2294–2299. learntechlib.org/p/11223

Dissertation

2015 **CE Eaton**. Reducing the Control Burden of Legged Robotic Locomotion through Biomimetic Consonance in Mechanical Design and Control. *Scholar Commons*. http://scholarcommons.usf.edu/etd/5680/

Presentations (Conferences in the Biological Sciences)

- 2018 CM Reynaga*, **CE Eaton**, G Strong**, E Azizi. Hindlimb mechanics and motor pattern response to varying compliant substrates in the Cuban tree frog. In *Integrative and Comparative Biology*, vol. 58, pp. E186-E186. Journals Dept, 2001 Evans RD, Cary, NC 27513 USA: Oxford Univ Press Inc, 2018.
- 2017 NC Holt, **CE Eaton**, E Azizi. Structural limits to mechanical work production in skeletal muscle. *Integrative and Comparative Biology*, vol. 57, pp. E295-E295. Journals Dept, 2001 Evans RD, Cary, NC 27513 USA: Oxford Univ Press Inc.
- 2017 CM Reynaga*, CE Eaton, E Azizi. Effects of substrate compliance on hindlimb kinematics of jumping Cuban tree frogs (Osteopilus septentrionalis). *Integrative and Comparative Biology*, vol. 57, pp. E138-E138. Journals Dept, 2001 Evans RD, Cary, NC 27513 USA: Oxford Univ Press Inc, 2017.
- 2016 NA Perez Varela**, NC Holt, **CE Eaton**, E Azizi. An innovative method for measuring muscle energetics using a thermo-camera. *Annual Biomedical Research Conference for Minority Students*, Nov 10, 2016.
- 2016 CM Reynaga*, E Azizi, **CE Eaton**. Effects of substrate compliance on the energetics of jumping tree frogs. Society for Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS) National Conference. Oct 14, 2016.

Service

Mentorship

Honors Theses: Committee Member

2021 C Miller, Issue Comment Patterns of Core Open Source Software Contributors

Independent Studies

- 2021 ISP D Gardner, Object-Oriented Programming in Python
- 2021 ISP G Swann, Academic Achievement and Metacognition: Machine Learning for Visual Thinkers

Peer Review

Bioinspiration & Biomimetics Journal of Biomechanics IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) IEEE International Conference on Robotics and Automation (ICRA) International Conference on Climbing and Walking Robots (CLAWAR)

Honors & Awards

2014	Spirit of Innovation Award – University of South Florida
2012	Locomorph Summer School Scholarship – University of Southern Denmark
2009	Presidential Scholarship – University of South Florida
2008	IEEE Student Chapter President – Tufts University
2006	Computing Undergraduate Scholars Program (CUSP) Fellow – Tufts University

CURRICULUM VITAE

January 2021

Name	Eirini Poimenidou, Ph. D
Address	Division of Natural Sciences New College of Florida 5800 Bay Shore Road, Sarasota, FL 34243-2109
E-mail	poimenidou@ncf.edu
Telephone	(941)-487-4379 (Office) or 487-4370 (Division Office)
Fax	(941)-487-4396
Citizenship:	Dual US and Greek Citizen

Education

University of Warwick, England, Ph.D. in Mathematics, 1989 (*Advisor: Trevor O. Hawkes*) University of Warwick, England, M.S. in Mathematics, 1985 University of Reading, England, B.S. in Mathematics, 1983

Academic Employment

Professor of Mathematics, New College, August 2013-present Associate Professor of Mathematics, New College, August 1999-2013 Assistant Professor of Mathematics, New College, August 1993-1999 Lecturer in Mathematics, Bryn Mawr College, September 1989-1993

Visiting Scholar Positions University of Thessaloniki, Greece, Fall 2014 University of Thessaloniki, Greece, AY 2007-08 University of Florida, Fall 1998

Grants and Awards

New College Faculty Development Grant, 2020 New College Faculty Development Grant, 2019 New College Faculty Development Grant, 2018 New College Faculty Development Grant, 2017 New College Faculty Development Grant, 2016 New College Faculty Development Grant, 2015 New College Faculty Development Grant, 2014 EDGE grant through Pomona College and Spelman Colleges (June 2013) New College Faculty Development Grant, 2013 New College Faculty Development Grant, 2012 New College Faculty Development Grant, 2011 New College Faculty Development Grant, 2010 New College Faculty Development Grant, 2009 National Technical University, Travel grant, 2008 New College Faculty Development Grant, 2008 Patterns Course Grant (with Colladay), Provost's Office 2006 EDGE grant through the Mellon Foundation \$115,000 (2004-2006) NSF grant with Salisbury University \$34,000 (2004-2006) New College Faculty Development Grant, 2006 Division of Natural Sciences Summer Grant, 2006 Association for Women in Mathematics (AWM) Grant, for 4th High School Math Day 2005 New College Faculty Development Grant, 2005 Division of Natural Sciences Summer Grant, 2005 New College Alumni Association Grant-4th Abstract Algebra Retreat, 2005 Division of Natural Sciences-4th Abstract Algebra Retreat Grant 2005 Patterns Course Grant (with Colladay), Provost's Office 2004 New College Faculty Development Grant, 2004 Division of Natural Sciences Summer Grant, 2004 New College Alumni Association Grant-3rd Abstract Algebra Retreat, 2003 Division of Natural Sciences-3rd Abstract Algebra Retreat Grant 2003 Association for Women in Mathematics (AWM) Grant, for 3nd High School Math Dav 2003 Anonymous Foundation Grant, Sarasota 2002 Division of Natural Sciences Grant, New College, 2002 New College Faculty Development Grant, 2002 Patterns Course Development Grant, New College 2002 (with Dr. Colladay) New College Faculty Development Grant, 2001 New College Dean and Warden Grant for High School Math Day, 2001 American Association for University Women (AAUW) Grant, for High School Math Day 2001 Association for Women in Mathematics (AWM) Grant, for High School Math Day 2001 New College Dean and Warden Grant for the Zassenhaus 2001 Group Theory Conference, 2000 New College Alumni Association Grant for the 2001 Abstract Algebra Retreat, 2000 Association for Women in Mathematics (AWM) Grant for the High School Math Day 1999 New College Dean and Warden Grant for the High School Math Day 1999 American Association for University Women (AAUW) Grant for High School Math Day 1999 New College Alumni Association Grant for the 1999 Abstract Algebra Retreat, 1999 Division of Natural Sciences Grant, New College for the 1999 Abstract Algebra Retreat, 1999 Department of Special Education Grant, University of South Florida (USF), 1998 International Travel Grant, USF Division of Sponsored Research, 1998 Faculty Development Grant, New College, 1997

International Travel Grant, Division of Sponsored Research (DSR), 1997 Zassenhaus Group Theory Conference Grant, USF Division of Sponsored Research of USF, 1996 Zassenhaus Group Theory Conference Grant, Office of Dean and Warden, 1996 Faculty Development Grant, New College, 1995 *Mathematica* Grant from RISCORP, Inc. 1995 (co-authored w/Dr David Mullins) (\$20,000) Faculty Development Grant, New College, 1994 **National Science Foundation (NSF), Planning Grant, 1991-1993** Association for Women in Mathematics, Travel Grant, 1991 Greek Scholarship Foundation, Doctoral Scholarship, 1985-1989

Professional Memberships

Mathematical Association of America (MAA) Association of Women in Mathematics (AWM) American Mathematical Society (AMS) Council on Undergraduate Research (CUR) (Elected CUR Councilor for Mathematics, 1997-2000)

PUBLICATIONS

(*) indicates student co-author

Justin Tienken-Harder* & Eirini Poimenidou: "On a Necessary and Sufficient Condition for the Hamiltonicity of Graphs", (in progress)

Fiona Bogart* & Eirini Poimenidou "Normal Power graphs of generalized products of Graphs" (in progress)

Sammuel Herman* & Eirini Poimenidou, "Orbits of Hamiltonian Paths and Cycles in complete graphs", Journal of Integer Sequences, Vol. 23 (2020), Article 20.7.6

Daniel McGinnis* & Eirini Poimenidou, "A method to construct 1-rotational factorizations of complete graphs and solutions to the Oberwolfach problem", Journal of Combinatorial Designs, Vol 27, Issue 2, February 2019

Erin Craig* & Eirini Poimenidou "An Extension of Rule 90 for One-Dimensional Cellular Automata over Non-Abelian Group Alphabets" chapter in "A Celebration of the EDGE Program's Impact on the Mathematics Community and Beyond" (Association for Women in Mathematics Series), Springer, September 2019

<u>Eirini Poimenidou & Ken Johnson</u> "*A formal power series attached to a class function on a group and its application to the characterization of characters*", Mathematical Proceedings of the Cambridge Philosophical Society, Vol. 155, Issue 3. (2013).

<u>Eirini Poimenidou & Michael Bardzell</u> "Binomial Coefficients Modulo a Prime: A Visualization Approach to Undergraduate Research", PRIMUS, 21(3), pp.238-251, 2011.

Eirini Poimenidou & Michael Bardzell & Katelin Childers*, Erin Craig*, Israa Taha *, "A padic Approach to Binomial Identities", The Pi Mu Epsilon Journal, Volume 13, Number 3, pp 133-142, 2010.

<u>Eirini Poimenidou & Michael Bardzell</u> "The Pascgalois Summer Undergraduate Research Retreats" FOCUS, Mathematical Association of America, May/June 2007, p18.

<u>Eirini Poimenidou & Homer Wolfe*</u> *Total Characters and Chebyshev Polynomials,* International Journal of Mathematics and Mathematical Sciences, Volume 2003, No. 38, 2447-2453.

Eirini Poimenidou & Ken Johnson Group Characters, Permutation Actions and Sharpness, European Journal of Combinatorics, 24, 2003, no.2 173-182

<u>E. Poimenidou & Amy Cottrell*</u>, *Total Characters of Dihedral Groups and Sharpness*, Missouri Journal of Mathematical Sciences, Vol. 12, No 1, 2000.

<u>K. W. Johnson & E. Poimenidou</u>, *Generalized classes in groups and association schemes: Duals of results on Characters and Sharpness*, European Journal of Combinatorics, 1999, (20) pp.87-92

<u>K. W. Johnson & E. Poimenidou</u>, *Group characters and* π *-sharpness*, Groups St. Andrews 1997 in Bath, London Mathematical Society Lecture Series 260, V II, Cambridge University Press, 1999, pp 429-435.

<u>E. Poimenidou</u> Erratum on *Fong Characters and Normal Subgroups of* π *-Separable Groups,* Journal of Algebra, 164, (1994), pp. 243.

<u>E. Poimenidou</u>, Fong Characters and Normal Subgroups of π -Separable Groups, Journal of Algebra, 151, (1992), pp. 192-217.

<u>E. Poimenidou</u>, On the Theory of Characters of π -Separable Groups, Doctoral Dissertation, University of Warwick, 1989.

Other Publications

<u>Eirini Poimenidou</u> "Sonia Kovalevsky High School Mathematics Day, New College of Florida" Newsletter of of the Association for Women in Mathematics (AWM), Volume 32, #4, July-August 2002, 15-18.

Eirini Poimenidou "Sonia Kovalevsky High School Mathematics Day, New College of USF"

Newsletter of the Association for Women in Mathematics (AWM), Volume 30, #4, May-June 2000, 25-26.

Conferences/Workshops Attended/Invited talks Joint Mathematics Meeting (JMM), January 2021 (virtual) Zassenhaus Group Theory Conference, Binghamton University SUNY, 2020 (virtual) LADS Workshop, New College of Florida, 2017 R-Studio Workshop, New College of Florida, 2016 EDGE Reunion 2015, Washington DC, 2015 Pineview High School, Sarasota, 2015 University of Thessaloniki, Algebra Seminar, Thessaloniki, Greece 2014 Zassenhaus Group Theory Conference, Ohio State University, 2012 8th Panhellenic Conf. in Algebra, Number Theory and Applications, Athens, GREECE, 2008 Workshop on Combinatorics and commutative Algebra II, Thessaloniki, GREECE, 2007 Joint mathematics Meeting 2006, San Antonio, TX 2006 Regional MAA meeting, New College of Florida, 2005 EDGE Reunion 2003-Pomona College, CA 2003 Regional AMS Conference-SUNY Binghamton 2003-(Special Session co-organizer) Ohio State University-Denison University, Group Theory Conference, OH 2002 Florida Collegiate Honors Council (FCHC, New College of Florida, 2002. Math, Art and Technology Conference, Ringling School of Art and Design, Sarasota, 2002 Math, Art and Technology Conference, Ringling School of Art and Design, Sarasota, 2001 Zassenhaus Group Theory Conference, New College of USF, 2001 Ohio State University-Denison University, Group Theory Conference, OH 2000 Math, Art and Technology Conference, Ringling School of Art and Design, Sarasota, 2000 Elon College Conference on "Rethinking Key Issues in College Learning" 1999 CUR Annual Councilors Meeting, Duluth, MN 1999 Math, Art and Technology Conference, Ringling School of Art and Design, Sarasota, 1999 CUR National Conference, Occidental College, CA 1998 CUR Councilors Meeting, Occidental College, CA 1998 Ohio State University-Denison University, Group Theory Conference, OH 1998 Math, Art and Technology Conference, Ringling School of Art and Design, Sarasota, 1998 Zassenhaus Group Theory Conference, New College of USF, 1997 Mathematica Workshop, CO, 1995 Miami University, OH, 1995 Ohio State University-Denison University, Group Theory Conference, OH 1994 Ohio State University-Denison University, Group Theory Conference, OH, 1992 Group Theory Conference, Warwick, UK, 1991 Representation Theory, MSRI Berkeley, CA, 1990

Referee for Journals

PRIMUS (*Problems, Resources, and Issues in Mathematics Undergraduate Studies*). Journal Of Algebra,

Special Teaching Projects

Invited Instructor for the EDGE (Enhancing Diversity in Graduate Education) program, Purdue University, 2-week long (2016) Invited Instructor for the EDGE (Enhancing Diversity in Graduate Education) program, Harvey Mudd College 2-week long (2014) Duke TIP Teaching Workshop "Cryptological Mathematics" 2012 Duke TIP Teaching Workshop "Cryptological Mathematics" 2009 Duke TIP Teaching Workshop "Cryptological Mathematics" 2008 Duke TIP Teaching Workshop "Cryptological Mathematics" 2005 Abstract Algebra Retreat 2005 Duke TIP Teaching Workshop "Cryptological Mathematics" 2004 Abstract Algebra Retreat 2003 Invited Instructor for the EDGE (Enhancing Diversity in Graduate Education) program, Bryn Mawr College 2-week long (2002) Abstract Algebra Retreat 2001 Food for Thought Project, 1999 Abstract Algebra Retreat 1999

Conferences/Workshops Organized

Enhancing Diversity in Graduate Education (EDGE)-New College June 2-July 28, 2013 Enhancing Diversity in Graduate Education (EDGE)-New College June 11-July 7, 2006 PascGalois Summer Undergraduate Research Retreat at New College, June 4-9, 2006 PascGalois Summer Undergraduate Research Retreat at New College, June 5-10, 2005 Regional AMS Conference-SUNY Binghamton 2003-(Special Session co-organizer) Zassenhaus Group Theory Conference, New College of Florida, January 4-7, 2001 Zassenhaus Group Theory Conference, New College of USF, January 10-12, 1997

Teaching Awards

Teaching Incentive Program (TIP) Award, Fall 1996, New College of USF

Other Professional Activity

Mount Holyoke College-NSF Faculty Enhancement Workshop, (1 week long) 1999

Certificates of Continued Education

"The Data Scientist's tool box"-Johns Hopkins University (Completed with Distinction) 2015 "R Programming"- Johns Hopkins University (Completed with Distinction) 2015

Community Involvement

Free Community Math Clinic, 1999-2010 (Director) 4th Sonia Kovalevsky High School Math Day, New College of Florida, 2005 (Organizer) 3rd Sonia Kovalevsky High School Math Day, New College of Florida, 2003 (Organizer) 2nd Sonia Kovalevsky High School Math Day, New College of Florida, October 26, 2001 (Organizer)

Sonia Kovalevsky High School Math Day, New College of USF, November 6, 1999 (Organizer) Sponsor of a High School Executive Internship student (1999)

Senior Thesis Supervised

- 1. "Lean: An interactive Proof Assistant" (title not finalized) co-sponsored with Professor Lepinski (Alexander Griffin, expected 2021)
- 2. "Normal Power Graphs of Finite Groups" (Fiona Bogart, 2020)
- 3. "On a Necessary and Sufficient Condition for the Hamiltonicity of Graphs" (Justin Tienken-Harder, 2019)
- 4. "Solutions to the Oberwolfach Problem and Odd Coverings of Graphs" (Daniel McGinnis, 2019)
- 5. "The α-Spectra of Various Families of Graph Products" (Zachary Hanna, 2019)
- 6. "Power Graphs of Finite Groups" (Kathryn Van Etten, 2019)
- 7. "Methods in Tiling with subsets of Zn", (Dante Giordano, 2015)
- 8. "Group Ring Cryptography" (Helen Moscardini, 2014)
- 9. "Sudoku Scheming: An Algebraic Combinatorial Approach to Discovering Properties of Sudoku Graphs using Association Schemes" (Ziva Myers, 2011).
- 10. "The Grobner Annihilator Graph of a Ring" (Trevor McGuire, 2009)
- 11. "One Dimension Cellular Automata: Pascal's Triangle and an Extension of Rule 90 for a Non-Abelian Group" (Erin Craig, 2009).
- 12. "A Centralizer approach to Computing the Chromatic Polynomial of a Simple Graph" (2004) (Alex Wires)
- 13. "Designs and Codes in Odd Graphs" (Mike Cenzer, 2001) (co-sponsor.Dr.Mcdonald)
- 14. "On Integer Flows in Cayley Graphs: Excursions in Tutte's 3-Edge Conjecture" (Scott Moser, 2001)
- 15. "Optimal Transitional Labelings of Graphs: A polarization approach", (Andrea Saunders, 2000)
- 16. "A New Class of Graphs with α-labelings" (Grant Barker, 1999)
- 17. "Fractional Domination in Graphs", (Anna Stevens, 1999)
- 18. "Total Characters of Dihedral Groups" (Amy Cottrell, 1997)
- 19. "Character Theory and The Group Determinant" (James Taylor, 1997)
- 20. "Applications of Character Theory to Quantum Mechanics" (John F. Huesman, 1996 with Dr. Kazaks)
- 21. "The Inverse Galois Problem", (Lorelei Stepp, 1996)
David Gillman

Associate Professor of Computer Science New College of Florida Sarasota FL 34234 dgillman@ncf.edu (941) 487-4118

BIO

I teach in the undergraduate Computer Science program and the Data Science master's program at New College of Florida.

I joined the faculty of New College in the fall of 2013, and that academic year I defined the requirements for the Computer Science Area of Concentration (AOC, or major). As of 2020 the department has five regular faculty and 60 students in the AOC.

In the spring of 2014 I helped begin planning the structure and curriculum of the New College Data Science master's program. The program began in January, 2016, and the first cohort of seven students graduated in May, 2017.

My recent research is in discrete structures, randomized algorithms, and machine learning for health care and music.

EDUCATION

PhD, Mathematics, MIT BA, Mathematics, Yale	1993 1986
EMPLOYMENT	
New College of Florida Assistant Professor of Computer Science	2013 - present
Akamai Technologies, Inc. Senior Architect	2000 - 2013
Peakstone Corporation Principal Scientist	May, 2000 – July, 2000
Iterated Systems, Inc. (later MediaBin, acquired by Interwoven, Inc.) Principal Scientist	1996 - 2000
University of Toronto Assistant Professor, Computer Science	1994 - 1996
Institute for Mathematics & Its Applications, University of Minnesota. Postdoctoral Research Associate	1993 - 1994

LEADERSHIP

- Created Computer Science program, New College; curriculum, recruitment, mentorship, 2013-16
- Co-created Data Science masters program, New College; structure, curriculum, recruitment, 2014-16
- Created and organized Liberal Arts Data Science Workshop, New College, 2017-18

SERVICE

- New College committees: Technology (2013-14), Education policy (2015-16, spring 2018), Diversity task force (2016-2017), Scholarship (fall 2017), Campus development (fall 2017), Natural Science Division budget (2015-18), Data Science curriculum (2015-18), Data Science admissions (2015-16)
- New College recruitment: Computer Science faculty search (2014-15, 2015-16 co-chair), Data Science director search (2017-18 co-chair), Computer science visitor searches (2015, 2018) and adjunct recruitment (2016, 2017)
- Collaboration on TEAm grant proposal for joint four-college computer science program, 2013-14

PROFESSIONAL DEVELOPMENT

- Sabbatical term, Georgia Tech, spring 2017
- Part-time work at Akamai Technologies, summer 2015
- Conferences attended: ACM SIGCSE (2014), ICERM Workshop on spectral graph theory (2014), Strata Data Science (2014), Federal R&D Agency Workshops (2015-16), Open Data Science Conference (2016), Georgia Tech ACO25 (2017), Workshop on Machine Learning for Healthcare (2017) ACM/SIAM SODA (2018), Analysis of Algorithms (2018)
- New College teaching workshops: Writing enhanced courses (2017), Active learning (2016)

PUBLICATIONS

- with D. Randall, "Slow Convergence of Ising and Spin Glass Models with Well-Separated Frustrated Vertices," Analysis of Algorithms 2018 (peer-reviewed conference).
- with C. Arias, E. Craig, "Predicting readmission from doctors' notes," poster (peer-reviewed) at ML4H, Neural Information Processing Systems Conference, 2017. (https://arxiv.org/abs/1711.10663)
- with B. Maggs, R. Sitaraman, Y. Lin, "Protecting mission-critical Web sites from attacks," Computer, volume 48, number 4, pages 26-34, April 2015.
- with M Sipitca, R. Mersereau, "Conditional DCT event coding without side information in video compression," IEEE International Conference on Image Processing, September, 2000.
- with M. Sipitca, "Conditional entropy coding of DCT coefficients for video compression," Proceedings of the SPIE Symposium on Image and Video Communications and Processing, January, 2000.
- with M. Sipitca, L. Hurd, "Reconstruction of bilevel images from a low quality JPEG," Proceedings of the SPIE Symposium on Image and Video Communications and Processing, January, 2000.
- "A Chernoff bound for random walks on expander graphs," SIAM Journal of Computing, volume 27, number 4, 1998.
- with R. Rivest, "Complete variable-length 'fix-free' codes," Designs, Codes, and Cryptography, volume 5, pages 109-114, 1995.
- with M. Sipser, "Inference and minimization for hidden Markov chains," Proceedings of the ACM Symposium on Computational Learning Theory, July 1994.
- with H. Kaper, M. K. Kwong, "L2-norm inequalities for the differentiation operator on compact intervals," Proceedings of the Royal Society of Edinburgh, volume 110A, pages 335-342, 1988.

PATENT

 with M. Sipitca, L. Hurd, U.S. patent 6434273, "Method for reconstructing a bi-level image from a low quality discrete transform image," filed June 28, 2000.

PRESENTATIONS

- "Slow Convergence of Ising and Spin Glass Models with Well-Separated Frustrated Vertices," Analysis of Algorithms, Uppsala Sweden, 2018.
- "DDoS Attack Detection Using Tsallis Entropy," Akamai Internal Research Symposium, Cambridge MA, 2018
- "Akamai Forcefield Log Mining," Akamai Internal Research Symposium, Cambridge MA, 2017
- "Data Science at New College of Florida," MIT Club of Southwest Florida, Sarasota FL, 2017
- "Ants and Bees: Some properties of cellular automata," Mathematics Department, Florida International University, Miami, 2016
- "Data Science at New College of Florida," Sarasota Economic Development Council, 2015

THESES SUPERVISED

- Sarah Cohen, 2018, "An Introduction to Computational Thinking"
- David Duffrin, 2017, graduate student, New College of Florida, "Estimating the Pronunciation of Japanese Kanji."
- Ben Carothers, 2017, Wevolver, "Building Monitored, Secured, And Self-sustaining IOT Hydroponic Gardens."
- Vinushka Schalk, 2016, Akamai Technologies, Inc., "Silicon Chemist 3: Guiding students through electron flow pathways," with a Web application for solving chemical reaction problems.
- David Weinstein, 2015, Amazon, "Infocatch: A more powerful feed provider built on Webscraping."
- Calvin Troutt, 2015, The Reynolds and Reynolds Co., "Competency Assessment and IRT", with a Web application for the New College Calculus readiness test.

STUDENT COMMUNITY SOFTWARE PROJECTS

- Inventory and scheduling, Planned Parenthood of Southwest and Central Florida, 2014
- Database and web application, MobileBits Holdings Corp., 2014
- Social media startup, Certrek, 2014
- Database and web application, Center for Engagement and Opportunity, New College, 2014-15
- Calculus readiness test web application, Mathematics Department, New College, 2014-15
- Mobile application for citizen science, Mote Marine Laboratory, 2015
- Programming projects with geographical data (with Justin Saarinen), 2015-16
- Software redesign, LifeJournal, 2016.
- NASA Space Apps Challenge, New College, 2016
- Interdisciplinary projects in computer science and other fields: drawing, classics, chemistry education, literature and games, reading education, robotics and animal behavior, hydroponic gardening, language learning, music composition, 2013-18

STUDENT RESEARCH SPONSORED

- Zachary Halladay, Isermann Fellowship project, cellular automata, 2016
- Sarah Cohen, Internet measurement, 2018

COURSES TAUGHT AT NEW COLLEGE, 2013-2018

- Undergraduate Core Courses Introduction to Programming in Python (2x), Functional Problem Solving, Object-oriented Programming (2x), Software Engineering, Database Systems with Linux, Algorithms, Software Development Projects
- Undergraduate Topics Courses Hacking, Distributed Computing, Digital Signal Pocessing, Digital Image Processing, Natural Language Processing
- Graduate Courses Data Storage & Retrieval (3x), Practical Data Science
- Tutorials Automated Chemical Reaction Solver, Game Development (C++, Unity), Python for GIS, Natural Language Processing, Compilers, Java, Clojure, 3D Data Visualization, Information Theory & Coding, Discrete Mathematics, Introduction to Mathematical Proof, Game Theory, Hacking, Software Projects (5x)
- Undergraduate Research Cellular Automata, Internet Measurement

OUTREACH

- Hour of Code, Bay Haven School of Basics Plus, Sarasota FL, 2015-17
- SRQHacks hackathon, New College, 2016
- National Day of Civic Hacking, Tampa, 2016; followup project on chronic homelessness with Tampa activist and Tampa Hillsborough Homelessness Initiative

PROFESSIONAL ORGANIZATIONS

• Association for Computing Machinery

ACTIVITIES

Conductor, Nateli community folk choir	2001 - 2007
Member, The Other Georgia folk trio	2007 - 2017
Leader, New College Shaped-note and Georgian choir, 2014 Performer, Inside In C, outdoor musical performance, New College, 2015	
Bird Street Community Center, Dorchester, MA	2010 - 2013

Board member, reading tutor

Music

Fahmida Hamid Assistant Professor Division of Natural Science New College of Florida

Personal Info	rmation		
Offic Phor Office Hour Emai	ce Heiser Natural Scie ne (941) 487-4171 rs Tuesday (3:00 PM ll: fhamid@ncf.edu	ences Complex (E172C, Room: E153) $\sim 5:\ 00\ PM$) or by appointment	
Research Exp	pertise		
Natural Lan	guage Processing, Infor	mation Retrieval, Recommender Systems	
Education			
July 2016 Fall 2011	Ph.D. in Computer Science & Engineering University of North Texas, USA Advisor: Dr. Paul Tarau all 2011 Date of Graduation: Jul 2016 Thesis: Evaluation Techniques and Graph-based Algorithms for Auto- matic Summarization and Keyphrase Extraction CGPA: 3.8/4.0		
Teaching			
	Spring 2021, NCF Fall 2020, NCF	Algorithms, Functional Programming (Haskell) Natural Language Processing, Object-Oriented Design	
Spring Fall Spring	2020, Grinnell College 2019, Grinnell College 2019, Grinnell College	Object-Oriented Programming (Java), Functional Programming (Scheme) Information Retrieval, Algorithms Theory of Computation, Functional Programming (Scheme)	
Fall	2018, Grinnell College	Theory of Computation, Functional Programming (Scheme)	
Spring 201 Fall 201	9, Bucknell University 8, Bucknell University	Algorithms, Programming Languages Introduction to Programming (Python)	
Publications			

- Fahmida Hamid and Farzana Rashid, Adjusting to The New Normal: Perspectives from An Introductory Programming Sequence Course, Computer Science Education Research Conference (2020)
- Fahmida Hamid, A Course-based Undergraduate Research Experience (CURE) in Computer Science: An Experience Report, CCSC-Central Plains (2020)
- Linh Tang and Fahmida Hamid, CAARS: A Context-Aware Artist Recommender System for Twitter Users, RecSys@FLAIRS(2020)
- Fahmida Hamid, David Haraburda and Paul Tarau, Evaluating Text Summarization Systems with a Fair Baseline from Multiple Reference Summaries, ECIR (2016)
- Fahmida Hamid and Paul Tarau, Anti-Summaries: Enhancing Graph based Techniques for Summary Extraction with Sentiment Polarity, CICLing (2015)
- Paul Tarau and Fahmida Hamid, Interclausal Logic Variables, ICLP (2014)
- Fahmida Hamid and Paul Tarau, Text Summarization as an Assistive Technology, PETRA (2014)

Job Experience

-			
July 2020	Visiting Assistant Professor		
Aug 2018	at Department of Computer Science		
	Grinnell College, Grinnell, IA		
July 2018	Visiting Assistant Professor		
Aug 2017	at Department of Computer Science		
_	Bucknell University, Lewisburg, PA		
July 2017	Visiting Lecturer		
Sept 2016	at Department of CSE		
	University of North Texas, Denton, TX		
Aug 2016	Research Assistant		
Jan 2015	at Department of CSE		
	University of North Texas, Denton, TX		
Dec 2014	Teaching Assistant		
Jan 2012	at Department of CSE		
	University of North Texas, Denton, TX		
Aug 2011	Lecturer		
Oct 2009	at Department of CSE		
	Eastern University, Dhaka, Bangladesh		
Technical Ski	lls		
Programmi	ng C, C++, Answer Set Programming, Scheme, Java,		
Languag	ges Haskell, Assembly, Prolog, Scala, Python, Perl, mySQL, PHP,		
	HTML		
То	ols Weka, Mallet, Matlab		
Cortific	Machina Larring by Stanford University on Coursers		
	ite Machine Learning by Staniord University on Coursera.		
Scholarships			
2014-2015	CENG Scholarship, UNT		
2011 2010			
2014	NSF PETRA Conference		
	Doctoral Consortium Award		
2011-2013	2011-2013 Academic Achievement Awards		
	University of North Texas, USA		
2000	Higher Secondary & Secondary School Certificate Exam Scholar-		
2000	ship		

1998 Board of Dhaka, Bangladesh

Projects

- $n^2 \times n^2$ Sudoku Board Solver & Puzzle generator (Answer Set Programming, Python)
- Peg Solitaire Auto Solver with A*, Depth First and Best First Search (Java)

- Tiny Search Engine, Web Crawler(Perl, LWP, HTTP)
- Automatic Grading System (Perl)

[•] Context-Aware Artist Recommender Systems (Python)

[•] DPLL solver (Java)

[•] Graph(Vertex) Coloring using SAT Solvers(Java)

[•] Build and update Semantic Network based on Question-Answers (Java)

- Butterfly An web browser (Java)
- FTP Client-Server System (C)
- Gothica Online Shopping System (PHP, MySQL)
- University Hall Management System (C#, ASP.NET)
- Simulate an election algorithm for distributed system(NS-2)
- Cryptanalysis of a Multilateral System(C)
- Email Deliver Agent for an Android Phone (Android SDK, Java)
- Microcomputer based Light Intensity Detector (Hardware Project)

Bernhard Klingenberg Professor of Statistics New College of Florida

CONTACT INFORMATION

Email: <u>bklingenberg@ncf.edu</u> *Web-page:* www.ArtofStat.com

EDUCATION

- Ph.D. in Statistics, Dept. of Statistics, Univ. of Florida (2004) Dissertation topic: Analysis of discrete time series data via generalized linear mixed models.
- Master of Science (Diplomingenieur) with highest honors, Graz Univ. of Technology, Austria (1998)
 Major in Mathematics, Statistics and Operations Research. Minor in Business Administration.
- Study Abroad at the Dept. of Statistics, Univ. of Sheffield, England (1997)
- Bachelor of Art (Major in Mathematics): Graz Univ. of Technology, Austria (1996)

PROFESSIONAL WORK EXPERIENCE

Teaching Positions:

- Professor of Statistics, Graduate Program in Data Science, New College Florida, Sarasota. (2018-)
- Associate Chair of Statistics, Dept. of Mathematics & Statistics, Williams College (2017/18)
- Full Professor of Statistics, Williams College (2016-)
- Visiting Professor, Institute of Statistics, Technical University Graz, Austria (*Fall 2014*, *Spring 2012, Fall 2007*)
- Visiting Professor, Institute of Mathematics, University of Salzburg, Austria (2011/12)
- Associate Professor of Statistics, Williams College (2010-2016)
- Assistant Professor of Statistics, Williams College, (2004-2010)
- Biostatistician, Novartis Pharma, Basel, Switzerland (2004)

Consulting:

- TreeAge Software, MA (*since 2014*), Clear Passage Physical Therapy, FL. (since 2011), Novartis Vaccines, Cambridge, MA (2009-2014), Novartis Pharma, Biostatistical Research Group, Basel, Switzerland (2004-2012),
- Institute for Food and Agricultural Sciences (IFAS), Statistical Consulting Unit, Univ. of Florida, (2000/01)
- Energie Steiermark (Electrical Utility Company), Graz, Austria, (1997–1999)

BOOKS, RESEARCH PAPERS & TALKS

Books and Book Chapters:

- 1. Agresti, A., Franklin, C., Klingenberg B., (2021). "Statistics: The Art and Science of Learning from Data", 5th edition, Pearson, 733 pages. See also: <u>www.ArtofStat.com</u>
- Klingenberg, B. and Rahman, F, (2014). "Pairwise comparisons with binary responses: Multiplicity adjusted p-values and simultaneous confidence intervals" in *Clinical Trial Biostatistics and Biopharmaceutical Applications*, Young, W and Chen, D. (editors), Chapman and Hall, 2014

Papers:

- 1. South, K, Klingenberg, B. and Leininger, E. (2021), "A novel degree of sex difference in laryngeal physiology of Xenopus muelleri: behavioral and evolutionary implications." Journal of Experimental Biology, accepted for publication.
- Zhan, C., Heatherington, L. and Klingenberg, B. (2020), "Disordered eating- and exerciserelated behaviors and cognitions during the first year college transition." Journal of American College Health, DOI: 10.1080/07448481.2020.1775608.
- Topaz, C., Klingenberg, B., Turek, D, et al. (2019), "Diversity of artists in major U.S. Museums.", PLoS ONE 14(3): e0212852. <u>https://doi.org/10.1371/journal.pone.0212852</u>
- 4. Iyer, M., Essner, M., Klingenberg, B. and Carter, M. (2018), "Identification of discrete, intermingled hypocretin neuronal populations", *Journal of Comparative Neurology*, Vol 15;526(18):2937-2954. DOI: 10.1002/cne.24490.
- Rice, Patterson, Reed, Wurn, Robles, Klingenberg, Weinstock, Pratt, King and Wurn. (2018). "Decreasing recurrent bowel obstructions, improving quality of life with physiotherapy: Controlled study", *World Journal of Gastroenterology*, 24(19): 2108-2119.
- 6. Fry, Ellis, Koontz, Shyne, Klingenberg, Fields, Chern and Blank. (2017) "Ovarian cancer survivors' acceptance of treatment side effects evolves as goals of care change over the cancer continuum", *Gynecologic Oncology*, *Vol. 146, Issue 2, 386–391.*
- Rice, Patterson, Reed, Wurn, Klingenberg, King, Wurn. (2016). "Treating Small Bowel Obstruction with a Manual Physical Therapy: A Prospective Efficacy Study", *BioMed Research International*, Vol. 2016, Article ID 7610387, doi:10.1155/2016/7610387
- 8. Klingenberg, B. (2015) "Multiple Comparison of Marginal Probabilities Following GEE estimation", *Proceedings of the 30th International Workshop on Statistical Modelling*, *Vol1*.
- 9. Klingenberg, B. (2014) "A new and improved confidence interval for the Mantel-Haenszel risk difference", *Statistics in Medicine (33)*, 2968-2983.
- Rice, Wakefield, Patterson, Reed, Wurn, Klingenberg, King, Wurn. (2014) "Development and Validation of a Questionnaire to Measure Serious and Common Quality of Life Issues for Patients Experiencing Small Bowel Obstructions", *Healthcare* (2) 139-149.
- 11. Klingenberg, B. and Satopaa, V. (2013), "Simultaneous confidence intervals for comparing margins of multivariate binary data", *Computational Statistics & Data Analysis (64)*, 87-98.

- Klingenberg, B. (2013), "On a null variance estimator for the Mantel-Haenszel risk difference and corresponding confidence interval", *Proceedings of the 28th International Workshop on Statistical Modelling*, Vol 2, 651-654.
- Klingenberg, B. (2008), "Dose-Response Modelling with Bivariate Binary Data under Model Uncertainty", *Proceedings of the 23rd International Workshop on Statistical Modelling*, Utrecht, 297-302.
- Klingenberg, B., Solari, A., Salmaso, L. and Pesarin, F. (2008) "Testing Marginal Homogeneity against Stochastic Order in Multivariate Ordinal Data", *Biometrics (65)*, 452-462.
- 15. Klingenberg, B. (2008), "Regression Models for Binary Time Series with Gaps", *Computational Statistics and Data Analysis (52)*, 4076-4090.
- 16. Klingenberg, B. and Xu, Y. (2007), "Simultaneous Confidence Intervals for Margins of Multivariate Data", *Proceedings of the Conference on Complex Models and Computational Intensive Methods for Estimation and Prediction (S.Co. 2007)*, Venice, Italy.
- 17. Klingenberg, B. and Agresti, A. (2006), "Multivariate Extensions of McNemar's Test", *Biometrics (62)*, 921-928.
- Agresti, A. and Klingenberg, B., (2005), "Multivariate Tests Comparing Two Vectors of Binomial Probabilities, with Application to Safety Studies for Drugs", *Journal of the Royal Statistical Society, Series C* (54), 691–706

Submitted for Publication:

1. Rice, Klingenberg, King. (2019), "Decreasing pain and improving quality of life in women with endometriosis with physiotherapy: Prospective study"

Talks (since 2005):

- "ArtofStat at K-12 Chat", online presentation hosted by the ASA's K-12 statistical ambassador, Dec. 2020
- 2. "Seeing is Believing", 2020 Electronic Conference on Teaching Statistics, online, May 2020
- "Simulations to Show the Beauty and Robustness of the CLT and Classical Inference", 32nd International Conference on Technology in Collegiate Mathematics (online), March 2020
- 4. "Diversity of Artists in U.S. Museums" or "A Data Scientist goes to the museum"
 - a. Annual Meeting of the American Statistical Association, Florida Chapter, Pensacola, FL, March 2020
 - b. New College of Florida, Sarasota, FL, September 2019
- 5. "Diversity on Display: Who's on the Wall at NGA?", Coding Our Collection: Datathon, National Gallery of Art, Washington D.C., October 2019
- 6. "Analysis of Categorical Data", Continuing Education Workshop, Joint Statistical Meetings, Denver, August 2019
- 7. "Apps in Intro Stats. When, Why and Where? "
 - a. United States Conference on Teaching Statistics, Penn State, May 2019
 - b. Digital Learning Webinar Series, online, April 2019
 - c. International Conference on Technology in Collegiate Mathematics, Phoenix, AZ, March 2019
- 8. "Multivariate Thinking: Should we pay our teachers less?", *Mount Greylock Regional High School,* Williamston, MA, May 2018
- 9. "A Confidence Interval for the Risk Difference in Meta Analysis", Graduate Program in Data Science, New College Florida, FL, April 2018
- 10. "Comparing Margins of Multivariate Binary Data", Wellesley College, Wellesley, MA, March 2018.
- 11. "Multivariate Binary Data: Analyzing Adverse Events in Influenza Vaccines", New College Florida, Florida, January 2018
- 12. "Intro Stats in the Cloud",
 - a. 30th International Conference on Technology in Collegiate Mathematics, Washington DC, March 2018.
 - b. 2017 United States Conference on Teaching Statistics, Penn State University, College Station, PA, May 2017
 - c. 29th International Conference on Technology in Collegiate Mathematics, Chicago, USA, March 2017.
- 13. "Short Course on Modeling Categorical Longitudinal Data", *City of Hope Cancer Research Center*, Pasadena, CA, USA, April 2016.
- 14. "Art of Stat: Web Apps for Introductory Statistics", 28th International Conference on Technology in Collegiate Mathematics, Atlanta, USA, March 2016.
- 15. "Statistical Questions in Neural Engineering", Institute of Neural Engineering, *Graz University of Technology*, Austria, August 2015.

- "A new and improved confidence interval for the Mantel-Haenzsel risk difference", Center for Medical Statistics, Informatics and Intelligent Systems, *Medical University of Vienna*, November 2014.
- 17. "Analysis of Ordinal Categorical Data", *City of Hope Cancer Research Center*, Pasadena, CA, April 2014.
- 18. "Comparing Margins of Multivariate Binary Data", Conference on Simultaneous Inference, Institute of Biostatistics, *Leibniz University Hannover*, Germany, September 2013.
- 19. "Simultaneous upper confidence bounds for relative risks",
 - a. FDA/Industry Statistics Workshop, Washington, DC, September 2009
 - b. 30th annual *International Society for Clinical Biostatisticians(ISCB)* meeting, Prague, Czech Republic, July 2009
 - c. Institute of Statistics, Technical University Graz, Graz, Austria, June 2009
 - d. Webinar for Novartis Vaccines, December 2008.
- 20. "Marginal homogeneity in multivariate ordinal data", Department of Biostatistics, *Yale University*, New Haven, CT, January 2009.
- 21. "Proof of concept and dose estimation with binary data"
 - a. Institute for Medical Informatics, Statistics and Documentation, *Medical University Graz*, Austria, June 2008,
 - b. Dept. of Statistics, University of Padua, Italy, June 2007,
 - c. First Dose Finding Conference, Philadelphia, February 2007.
- 22. "Testing marginal homogeneity in multivariate ordinal data, with applications in toxicity and drug safety"
 - a. Biostatistical Research Group, Novartis Pharma AG, Basel, Switzerland, May 2008,
 - b. Institute of Statistics, *Technical University Graz*, Graz, Austria, May 2008.
- 23. "Statistical inference", short course at the 2008 *Board of European Students of Technology* (BEST) educational conference, Graz, February 2008.
- 24. "Testing dose-response with multivariate ordinal data", Institute of Medical Statistics, *Medical University of Vienna*, Austria, October 2007.
- 25. "Simultaneous confidence intervals for margins of multivariate data", invited talk, Statistics and Computing Conference (SCO 2007), Venice, Italy, September 2007.
- 26. "Combining multiple comparison and modeling in dose finding studies", Conference on Dose Finding, *Novartis Pharma AG*, Basel, Switzerland, February 2007.
- 27. "Analyzing adverse events in drug safety studies", invited talk at the biannual meeting of the Austrian-Swiss chapter of the *International Biometric Society*, Graz, Austria, September 2005.

Conference Abstracts and Posters (refereed):

- 1. Klingenberg. (2019). "There is an app for that!", 2019 United States Conference on Teaching Statistics, Penn State University, College Station, PA, May 2019
- 2. Klingenberg and Franklin. (2017). "Take a Risk: Talk about the Risk Ratio", *2017 United States Conference on Teaching Statistics*, Penn State University, College Station, PA, May 2017
- 3. Rice, King, Wurn, Wurn, Klingenberg. (2015). "Treating Small Bowel Obstruction with a Manual Physical Therapy: A Controlled Prospective Efficacy Study", Gastroenterology (148), 4, Supplement 1, S-644.
- 4. Klingenberg, B. (2013) "A new variance estimator for the Mantel-Haenszel risk difference", 28th International Workshop on Statistical Modelling, Palermo, Italy.
- 5. Klingenberg, S., Leitner, J., Klingenberg, B., Ulrich, D. and Schoell, W. (2008) "Steigende Sectiorate und kindliche Kurzzeitmorbidität" *Geburtshilfe und Frauenheilkunde* (68) 424. (in German)

Conference Talks (contributed):

- "Exchangeability for multivariate binary observations", 31st annual International Society for Clinical Biostatisticians (ISCB) meeting, Montpelliere, France, August 2010.
- 2. "Simultaneous score bounds for risk differences", 31st annual International Society for Clinical Biostatisticians (ISCB) meeting, Montpelliere, France, August 2010.
- 3. "Dose-response for bivariate binary data under model uncertainty", *23rd International Workshop on Statistical Modelling* (IWSM 2008), Utrecht, Netherlands, July 2008.
- 4. "Proof of concept and dose estimation with binary data", *Multiple Comparison Conference* (MCP 2007), Vienna, July 2007.
- 5. "A unified framework for dose-response with binary data", annual meeting of the *Eastern North American Region/International Biometric Society* (ENAR), Atlanta, GE, March 2007.
- 6. "Multivariate extensions of McNemar's test, with application to drug safety", annual *Joint Statistical Meetings* (JSM), Minneapolis, August 2005.
- 7. "Multivariate analysis of binary data from drug safety trials", annual meeting of the *Eastern North American Region/International Biometric Society* (ENAR), Austin, TX, March 2005.

AWARDS, HONORS AND SCHOLARSHIPS

- 2015: Internal Grant (World Fellowship): Project: "Statistics in the Digital Age" (\$18,082)
- 2013: Internal Grant (World Fellowship): Project: "Evaluating Vaccine Safety for Efficient Public Health Interventions" (\$13,800)
- 2007 Hellman Foundation. Project1: "Statistical Evaluation of Drug Safety and Toxicology".
- & 2008: (\$10,700). Project 2: "Statistical Considerations in Drug Development" (\$2,150)
 - 2005: Young Researcher's Travel Award (\$1,000), Univ. of Florida Winter Workshop 2005.
 - 2002: Alec-Courtelis Award for outstanding international graduate student
 - 2000: William Mendenhall Award, for the most outstanding first year graduate student.
 - 1999: Post-graduate stipend from the Austrian Department of Science and Technology (\$20,000)
 - 1998: Fulbright Scholarship for 5 years of sponsored graduate studies in the United States.

ACTIVITIES AT NEW COLLEGE FLORIDA

Courses taught:

Graduate Program in Data Science:

- Statistical Inference for Data Science I & II
- Data Visualization, Presentation, Reporting, and Reproducible Research
- Special Topics in Statistics: Advance Statistical Modeling

Thesis Students:

• Josh Ingram (2021)

Undergraduate Program:

- Categorical Data Analysis
- Statistical Consulting

ACTIVITIES AT WILLIAMS COLLEGE

Courses taught at Williams:

STAT 101: Elementary Statistics and Data Analysis STAT 201: Statistics and Data Analysis STAT 202: Introduction to Statistical Modeling STAT 231: Design of Experiments STAT 346: Regression and Forecasting STAT 358: Introduction to Biostatistics STAT 360: Statistical Inference STAT 440: Categorical Data Analysis STAT 013: Roulette (Winter Study) STAT 010: Displaying Multivariate Data with R STAT 014: A Taste of Austria (Winter Study)

Scientific Talks at Williams since 2015:

- "How to (Not) Lie with Statistics", Faculty Lecture Series talk, March '18
- "Exact Test for the Difference of Proportions", Statistics Colloquium Series, Oct. '16
- "Multiple Comparisons of Marginal Probabilities", Statistics Colloquium Series, Oct. '15

Thesis Students:

• Ya Xu (2005), Doug Hammond (2006), Alec Graeves-Tunnell (2011), Faraz Rahman (2014), Hae-Min Jung (2017), Fangyuan Zhao (2018)

Christopher Kottke

New College of Florida Mathematics, Division of Natural Sciences 5800 Bay Shore Rd Sarasota, FL 34243 USA

ckottke@ncf.edu https://ckottke.ncf.edu/ Last updated: January 11, 2021

Education

2010	Ph.D.	Mathematics,	Massachusetts	Institute o	f Technology

2004 B.A. Mathematics, B.A. Physics, Tufts University

Professional Appointments

2016 -	Assistant Professor, New College of Florida
Fall 2019	Research Member, Mathematical Sciences Research Institute
2013 - 2016	Research Instructor, Northeastern University
2010 - 2013	Tamarkin Assistant Professor, Brown University

Research Interests

Global analysis and topology of moduli spaces, geometric microlocal analysis, mathematical physics.

Publications and Preprints

- 1. Products of manifolds with fibered corners. (With F. Rochon). Preprint. 40 pages, (2020).
- 2. Low energy limit of the resolvent of some fibered boundary operators. (With F. Rochon). arXiv:2009.10108, 44 pages, (2020).
- Bigerbes. (With R. Melrose). Algebraic and Geometric Topology, to appear. arXiv:1905.03081, 56 pages, (2019).
- 4. Monopoles and the Sen conjecture: Part I. (With K. Fritzsch and M. Singer). arXiv:1811.00601, 28 pages, (2018).
- Functorial compactification of linear spaces. Proceedings of the AMS, 147(9):4067-4081, (2019). arXiv:1712.03902.
- Partial compactification of monopoles and metric asymptotics. (With M. Singer). Memoirs of the AMS, to appear. arXiv:1512.02979, 113 pages, (2015).
- Blow-up in manifolds with generalized corners. International Mathematical Research Notices, 2018(8):2375-2415, (2018). arXiv:1509.03874.
- 8. Equivalence of string and fusion loop-spin structures. (With R. Melrose). arXiv:1309.0210, 48 pages, (2013).
- Dimension of monopoles on asymptotically conic 3-manifolds. Bulletin of the LMS, 45(5):818-834, (2015). arXiv:1310.2974.
- 10. Loop-fusion cohomology and transgression. (With R. Melrose). Mathematical Research Letters, 22(4):1177–1192, (2015). arXiv:1309.7674.

- 11. A Callias-type index theorem with degenerate potentials. *Communications in PDE*, 40(2):219-264, (2015). arXiv:1210.3275.
- Generalized blow-up of corners and fiber products. (With R. Melrose). Transactions of the AMS, 367(1):651–705, (2015). arXiv:1107.3320.
- An index theorem of Callias type for pseudodifferential operators. Journal of K-Theory, 8(3):387–417, (2011). arXiv:0909.5661.
- Accurate finite-difference and time-domain simulation of anisotropic media by subpixel smoothing. (With A.F. Oskooi and S. Johnson). Optics Letters, 34(18):2778–2780, (2009).
- 15. Perturbation theory for anisotropic dielectric interfaces, and application to sub-pixel smoothing of discretized numerical methods. (With A.F. Oskooi and S. Johnson). *Physical Review E*, 77(3):6611–6621, (2008).
- Vortex core identification in viscous hydrodynamics. (With L. Finn and B. Boghosian). Philosophical Transactions of the Royal Society A, 386(1833):1937–1948, (2005).

Awards and Academic Honors

2018 - 2021	NSF Grant DMS-1811995 RUI: Analysis on HyperKähler Moduli Spaces, PI
2017 - 2018	Simons Foundation Collaboration Grant for Mathematicians, Award ID: 524260
2011 - 2012	AMS-Simons Postdoctoral Travel Grant
2009	Charles and Holly Housman Award for Excellence in Undergraduate Teaching, MIT
2005	Presidential Fellowship, MIT

Academic Talks

Invited Talks at Conferences and Seminars

2021	Jun	Analysis, Geometry and Topology of Singular PDE, Oberwolfach
	Feb	Geometry, Analysis, and Quantum Physics of Monopoles, BIRS, online
2020	Oct	Recent developments in Gauge Theory, AMS sectional, online
2019	Nov	Colloquium, University of California Santa Cruz
	Oct	Seminar, MSRI
	Jan	Seminar, Michigan State University
2018	Oct	Seminar, Purdue University
	Oct	Index Theory: Interactions and Applications, University of Toulouse
	Sep	Geometric Analysis and Mathematical Physics, University of Oldenburg
	Apr	Workshop on Geometric Quantization, BIRS
2017	Jun	Analysis and topology in interaction, Cortona
	Jan	Seminar, University of Waterloo
2016	Dec	Geometric and spectral methods in PDE, BIRS Oaxaca
	Oct	Seminar, MIT
	Mar	Seminar, Duke University
2015	Dec	Analysis on singular manifolds, CMS Winter Meeting, Montreal
	Oct	Seminar, Stanford University
	Sep	Seminar, MIT
	Jan	Seminar, Boston University
Jul	–Aug	Metric and analytic aspects of moduli spaces, visiting fellow, Newton Institute
2014	Dec	Seminar, Purdue University
	Nov	Geometric scattering theory and applications, BIRS
	Jul	String geometry and loop spaces, Greifswald University

- Jun Analysis and topology in interaction, Cortona
- Apr Seminar, Boston University
- Mar Seminar, Worldwide Center of Mathematics
- 2013 Nov Seminar, University of Montreal
 - Oct Geometric and spectral analysis, AMS Sectional, Temple University
 - Sep Seminar, Northeastern University
 - May Seminar, University College London
 - Mar Geometric and singular analysis, Potsdam University
 - Mar Seminar, Boston University
- 2012 Jun Spectral invariants on singular and non-compact spaces, CRM
 - May Analysis and geometric singularities, Oberwolfach
 - Apr Spring lecture series, University of Arkansas
 - Mar Seminar, Purdue University
- 2011 Jun Microlocal methods in mathematical physics and global analysis, University of Tübingen Mar Seminar, Temple University Mar Seminar, Northeastern University
- 2010 Aug Topics in spectral and scattering theory, Penn State University
- Jun Talbot workshop on loop groups and twisted K-theory, Breckenridge
- 2009 Dec Seminar, Brown University
 Oct Microlocal analysis and spectral theory on singular spaces, AMS Sectional, Penn State
 Apr Singularities at MIT, MIT
- 2008 Aug Second symposium on spectral and scattering theory, Federal University of Pernambuco

Other Conferences Attended

2019	Oct	Recent developments in microlocal analysis, MSRI
	May	Microlocal methods in analysis and geometry, CIRM
2016	Jun	Geometry and topology of stratified spaces, CIRM
2013	May	Control, index, traces and determinants, Conference for Jean-Michel Bismut, Orsay
2011	Oct	Microlocal methods in spectral and scattering theory, Northwestern University
	Jan	Geometric analysis, CIRM
2010	Mar	Geometric scattering theory and applications, BIRS
2009	Jul	Spectral theory and geometric analysis, Northeastern University
2008	Jun	Geometric applications of microlocal analysis, CIRM

Professional Activities

Member:	American Mathematical Society, 2016–present
Reviewer:	Advances in Mathematics, American Mathematical Monthly, Annales Henri Poincaré, Annals of Global Analysis and Geometry, Communications in PDE, Compositio Mathematica, Geometry and Topology, Journal of Geometric Analysis, Springer Graduate Texts.
Organizer:	Geometry of Gauge Theoretic Moduli Spaces, AMS Sectional, U. Florida, November 2019
	The Sen Conjecture and Beyond, University College London, June 2017
	Geometry and Topology Seminar, Brown University, 2011–2013
Service:	Putnam exam supervisor: New College of Florida 2018, Northeastern University 2015
	Scholarship Committee, New College of Florida, Fall 2018–present
	Campus Climate and Community Committee, New College of Florida, Fall 2020–present
	Author and maintainer of ncfthesis, open source LATEX class for New College of Florida theses

Teaching

New College of Florida

Advanced Linear Algebra (Spring 2017) Complex Analysis (Spring 2021, Fall 2018, Spring 2017) Distribution Theory (Spring 2019) First year seminar: Mathematical Thinking (Fall 2020) Functional Analysis (Fall 2016) Multivariable Calculus (Fall 2020, Fall 2018, Fall 2017, Fall 2016) Partial Differential Equations (Spring 2020, Spring 2018) Real Analysis I (Fall 2017) Real Analysis II (Spring 2018) Writing in Mathematics (Spring 2021, Spring 2020, Spring 2019) Tutorial: Category Theory (Spring 2020, Spring 2019) Tutorial: Differential Topology and Geometry (Spring 2019, Fall 2017, Fall 2016) Tutorial: Mathematical cryptography (Spring 2018) Tutorial: Math GRE preparation (Fall 2018, Fall 2017) Tutorial: Putnam exam preparation (Fall 2020, Fall 2018, Fall 2017, Fall 2016) Tutorial: Riemann Surfaces (Spring 2019) Tutorial: Topology/Algebraic Topology (Fall 2020, Spring 2020, Fall 2018, Spring 2018, Fall 2017, Spring 2016) Tutorial: Writing in Mathematics (Spring 2018)

Northeastern University

Graduate Topics in Differential Geometry (Spring 2016) Multivariable Calculus (Fall 2015, Spring 2015, Spring 2014) Real Analysis (Fall 2015, Fall 2014, Fall 2013) Undergraduate Directed Study: Differential Topology (Spring 2014)

Brown University

Abstract Algebra (Spring 2013) Differential Equations and Nonlinear Dynamics (Fall 2012) Graduate Algebraic Topology II (Spring 2012) Honors Linear Algebra (Spring 2013, Spring 2011) Honors Vector Calculus (Fall 2010) Intermediate Calculus (Fall 2011) Introduction to Mathematical Cryptography (Fall 2011)

Massachusetts Institute of Technology

TA: Differential Equations (Spring 2010, Spring 2009, Spring 2007) TA: Multivariable Calculus (January 2010, January 2009, January 2008)

Mentoring

Undergraduate theses supervised

- 2019 David (Bruce) Guild, Disruptive Mathematicians
- $2019 \quad {\rm Zachary\ Halladay,\ } Topological\ K-theory\ and\ Bott\ periodicity$
- 2017 Jacob Price, Knot Theory and the Alexander Polynomial

Matthew Lepinski, Ph.D. Curriculum Vitae

Experience

- New College of Florida Assistant Professor of Computer Science, 2015 - Present
- BBN Technologies Research Scientist, Cyber-Security, 2006 - 2015

Education

- Ph.D. in Computer Science: Massachusetts Institute of Technology September 2006 Thesis: "Steganography and Collusion in Cryptographic Protocols"
- M.S. in Computer Science: Massachusetts Institute of Technology June 2002 Thesis: "On the Existence of 3-Round Zero-Knowledge Proof Systems"
- B.S. in Computer Science: Rose-Hulman Institute of Technology June 2000 Graduated Summa Cum Laude. Double Major in Math, Minor in Economics.

Research Interests

- Internet Infrastructure Security
- Game Theory
- Cryptography

Teaching Experience : Undergraduate Computer Science

•	Computer Networks :	2015, 2017, 2019
•	Cryptography and Network Security :	2016, 2018
•	Object-Oriented Design :	2016, 2017, 2019
•	Introduction to Programming :	2015, 2016, 2017, 2019
•	Discrete Mathematics for Computer Science :	2017, 2019, 2020
•	Databases and Web Applications :	2017
•	Algorithms :	2020
•	Principles of Programming Languages :	2020
•	Narrative, Writing and Video Games :	2019

Teaching Experience : Graduate Data Science

- Distributed Computing for Data Science : 2016, 2017, 2018, 2019, 2020
- Software Engineering for Data Science : 2016

Publications : Internet RFCs

- ""BGPSec Design Choices"
 Rob Austein, Steven Bellovin, Randy Bush, Russ Housley, Matthew Lepinski, Stephen Kent, Warren Kumari, Doug Montgomery, Kotikalapudi Sriram, and Samuel Weiler RFC 8374, April 2018
- "BGPSEC Protocol Specification"
 Rob Austein, Steven Bellovin, Randy Bush, Russ Housley, Matthew Lepinski, Stephen Kent, Warren Kumari, Doug Montgomery, Kotikalapudi Sriram, and Samuel Weiler RFC 8205, September 2017
- "Signed Object Template for the Resource Public Key Infrastructure" Matthew Lepinski, Andrew Chi, and Stephen Kent RFC 6488, February 2012.
- "Manifests for the Resource Public Key Infrastructure" Rob Austein, Geoff Huston, Stephen Kent, and Matthew Lepinski RFC 6486, February 2012
- "A Profile for Route Origin Authorizations (ROAs)" Matthew Lepinski, Stephen Kent, Derrick Kong RFC 6482, February 2012
- "An Infrastructure to Support Secure Internet Routing Matthew Lepinski and Stephen Kent RFC 6480, February 2012
- "An Architecture for Location and Location Privacy in Internet Applications" Richard Barnes, Matthew Lepinski, Alissa Cooper, John Morris, Hannes Tschofenig, and Henning Schulzrinne RFC 6280, July 2011
- "Additional Diffie-Hellman Groups for Use with IETF Standards" Matthew Lepinski, and Stephen Kent RFC 5114, July 2008

Publications : Peer-Reviewed Journal Articles

- "Perfect Implementation"
 Sergei Izmalkov, Matthew Lepinski, and Silvio Micali
 Games and Economic Behavior, vol. 71, Issue 1, January 2011
- "Dual Approach to Triangle Sequences"
 Sami Assaf, Li-Chung Chen, Tegan Cheslack-Postava, Benjamin Cooper, Alexander Diesl, Thomas Garrity, Mathew Lepinski, and Adam Schuyler INTEGERS, volume 5(1), 2005.

Publications : Peer-Reviewed Conference Papers

- "A Usage-Based Mechanism for Securing Systems via Blockchains" Eric Brigham, John Doucette and Matthew Lepinski In the proceedings of the IEEE International Conference on Decentralized Applications and Infrastructure (DAPPCON), 2019
- "Playing Games in Many Possible Worlds"
 Seth Gilbert, April Rasala Lehman, Matthew Lepinski and David Liben-Nowell
 In the proceedings of the 7th ACM Conference on Electronic Commerce (EC), 2006
- "Rational Secure Function Evaluation and Ideal Mechanism Design" Sergei Izmalkov, Matthew Lepinski and Silvio Micali. In the proceedings of the 46th Foundations of Computer Science (FOCS), 2005.
- "Collusion-Free Protocols" Matthew Lepinski, Silvio Micali and Abhi Shelat. In the proceedings of the 37th ACM Theory of Computing (STOC), 2005.
- Fair Zero-Knowledge" Matthew Lepinski, Silvio Micali and Abhi Shelat.
 In the proceedings of the 2nd Theory of Cryptography Conference (TCC), 2005.
- "Coalition-Safe Cheap Talk" Matthew Lepinski, Silvio Micali, Chris Peikert and Abhi Shelat.
 In the proceedings of the 23rd Principles of Distributed Computing (PODC), 2004.

Supervised Undergraduate Honors Theses

 "Using the Bloomberg Terminal to Evaluate Stock Market Trends: An Analysis of Historical EPS Forecast Accuracy for Firms in the 2019 S&P 500 Index Marco Acebedo

- "Game Changer Mobile App" Jordan Deagan, 2020
- "Jrag and Jrop : A Java Design Tool for Determining the Effect Aesthetic Properties have on User Perceived Professionalism" Kyle Dennison, 2020
- "You Sew Fine: A Mobile Application about Fabric and Body Measurements" Maya Holt-Teza, 2020 [Thesis Co-Supervisor]
- "Welcome to my Ted Talk: A Sentiment Analysis of Ted Talks from Founders to Better Understand how to Pitch Venture Capitalists" Jennifer Greenberg, 2020
- "Utilizing Geospatial Data as a Means to Detect Undersea Scars" Tom Kane, 2020
- "A Survey of Modern Astronomy" Meghan Retaleato, 2020
- "An Exploration of Censorship Resistant Decentralized Applications" Ben Weisman, 2020
- "Investigations into Elliptic Curve Cryptography with Diffie-Hellman" Brandon Baufield, 2019
- "Blockchains: Secure Systems, Distributed DNS, Attack Vectors, Selfish Miners" Eric Brigham, 2019
- The One with No Author: An Exploration of Text Generation Models with Friends Jennifer Ha, 2019
- "Files in (Cyber) Space: Comparing the Security of BitTorrent with the Interplanetary File System"
 Genevieve Liberte, 2019
- "It's a Catch: Paradigms of iOS Applications" Marty Chenyao, 2018
- "More Rings More Problems: A Discussion of Number Fields for Homomorphic Cryptography" Jeremy Cohen, 2018
- "Developing a Mobile Solution for Visitors to Glacier National Park" Cora Coleman, 2018
- "Exploring Data Visualization in Quantitative Journalism: A Case Study Depicting the 1975's Success Story" Caitlyn Ralph, 2018
- "Evaluating Object-Oriented Designs and Their Usage of Design Patterns" Dalen Brauner, 2017

Awards, Honors, and Professional Service

- Florida Center for Cybersecurity Advisory Counsel, 2018-2019
- Peer Review for SIGCSE, 2017-2019
- Chair of IETF HTTP Authentication Working Group, 2013-2015
- Chair of IETF Nominating Committee, 2012-2013
- Member of the IETF Security Directorate, 2011-2016
- Secretary of the IETF DANE working group, 2009-2011
- NSF Graduate Research Fellowship, 2000
- Barry M. Goldwater Scholarship, 1998

Selected Technical Presentations

- "Think Global, Hack Local : County Managed Elections and the Fate of American Democracy" Southern Political Science Association, Annual Meeting San Juan, Puerto Rico. January 2020
- "Securely Routing Data on the Public Internet" Carleton College Northfield, MN. October 2016
- "Securely Routing Data on the Public Internet" Rose-Hulman Institute of Technology Terre Haute, IN. September 2016
- "Randomness and Pseudorandomness" Eckerd College Saint Petersburg, FL. October 2012
- "Geolocation, Whois, and IPv6" 32nd APNIC Conference, Lightning Talks Busan, South Korea. September 2011
- "Do We Need a Registry for IP Geolocation Information?" 30th APNIC Conference Gold Coast, Australia. August 2010
- "Route Origination Authorizations: The Use of Digitally Signed Objects for Improved Routing Security" IEEE Global Communications Conference Honolulu, HI. December 2009
- "IP-based Emergency Services"
 26th APNIC Conference
 Christchurch, New Zealand. August 2008

PATRICK T. MCDONALD

960 Indian Beach Drive, Sarasota, FL 34234 Home: (941) 316-9239 Work: (941) 487-4375 email: mcdonald@ncf.edu

RESEARCH INTERESTS

Geometric Analysis, Probability, Mathematical Physics, Machine Learning.

	EDUCATION 9/86 - 6/90	Massachusetts Institute of Technology, Cambridge, MA Ph.D. in Mathematics Thesis Advisor : Professor R. B. Melrose Thesis Title : The Laplacian on Spaces With Cone-Like Singularity
	9/82 - 6/86	The Ohio State University , Columbus, OH B.S., M.S. in Mathematics with honors and distinction, Battelle Scholar Phi Beta Kappa, 1985 Undergraduate Research Scholarship
	EMPLOYMENT 2014 - 2019 2005 - present	New College of Florida, Sarasota, FL Founding Director, Master of Science in Data Science program Professor, Division of Natural Science
	2000 - 2005	Associate Professor, Division of Natural Science
	2004	University of South Florida, Tampa, FL Adjunct Professor , Department of Mathematics
	1995 - 2000	New College of the University of South Florida, Sarasota, FL Assistant Professor , Division of Natural Science
	1994	The Ohio State University, Columbus, OH Instructor, Department of Mathematics
	1993	Denison University Granville, OH Visiting Professor , Department of Mathematics
	1990 - 1993	The Ohio State University, Columbus, OH Research Instructor, Department of Mathematics
	9/88 — 6/90 Summer 87 — 89 Summer 88	Massachusetts Institute of Technology, Cambridge, MA Research Assistant, Department of Mathematics Graduate Student Lecturer, Department of Mathematics Lecturer, MIT Project Interphase
CONS	SULTING	
	2018 - 2019	Distilled Analytics , Cambridge, MA Financial Tech
	2016 - 2018	Cienaga Systems , Bradenton, FL Cybersecurity
	2015 - 2017	Lovelace Respiratory Research Institute , Albuquerque, NM Data Science

MEMBERSHIPS AND VISITING POSITIONS

04/19	Bucknell University , Lewisburg, PA Distinguished Visiting Professor of Mathematics
03/17	Bucknell University , Lewisburg, PA Distinguished Visiting Professor of Mathematics
10/08	Mathematical Science Research Institute, Berkeley, CA Special Program in Analysis on Singular Spaces
4/04	Banff International Research Station , Banff, Canada Special Program in Analytic and Geometric Aspects of Stochastic Processes
9/01 - 9/02	Massachusetts Institute of Technology, Cambridge, MA
6/98 - 7/98	New College, Oxford University, Oxford, UK (Visiting Fellow)
6/98	Mathematische Forschunginstitut Oberwolfach, Oberwolfach, DE (Program Participant) Special Program in Analysis on Singular Spaces
2/98 - 3/98	Mathematical Science Research Institute, Berkeley, CA Special Program in Stochastic Analysis
10/97 - 11/97	Fields Institute , Toronto, Canada Special Program in Microlocal Analysis and Geometry
6/97 - 7/97	Mathematical Research Institute, Columbus, OH
6/96 - 7/96	Institute for Advanced Study, Princeton NJ IAS/PCMI Research Program in Probability

GRANTS AND AWARDS

10/08	Mathematical Science Research Institute, Berkeley, CA
	awarded \$4,000 and travel

05/05 **Mathematical Association of America** Distinguished College or University teaching of Mathematics - State of Florida award

12/98 **Florida State University System** Teaching Incentive Program - Award for outstanding teaching in the State System, awarded \$5,000 to base salary

GRANTS AND AWARDS

10/98	National Science Foundation "Workshop on L^2 -Methods in Geometry" DMS9972298 awarded \$22,500
10/98	Department of Sponsored Research, University of South Florida "A Symposium on Geometric Analysis" awarded \$10,000
9/98	New College Office of the Dean and Warden , New College "A Symposium on Geometric Analysis" awarded \$2,000
2/98 - 3/98	Mathematical Science Research Institute, Berkeley, CA awarded \$2,000
3/97 - 3/98	Department of Sponsored Research, University of South Florida "Stochastic Models for Contaminant Dispersion" awarded \$6,793
$6/96, \ 6/97, \ 6/99-6/14$	New College Faculty Development Fund Summer support for research

PUBLICATIONS

- 1. The Laplacian on Spaces With Cone-Like Singularities, MIT Thesis, (1990), 71 pages.
- On the functional logdet and related flows on the space of closed embedded curves on S² -with D. Burghelea, L. Friedlander, T. Kappeler, Jour. Func. Anal. 120 (1994), pages 440-466.
- 3. Analytic and Reidemeister torsion for representations in finite type Hilbert modules -with D. Burghelea, L. Friedlander, T. Kappeler, GAFA, 6 (1996), pages 751-859.
- The extended generalized lambda distribution system for fitting distribution to data: history, completion (theory and tables) and applications the final word on moment fits -with Z. Karian, E. Dudewicz, Comm. Stat.: Simulation and Computation, 25 (1996), pages 611-642.
- 5. Brownian functionals on hypersurfaces in \mathbb{R}^n -with K. Kinateder, Proc. AMS, **125** (1997), pages 1815-1822.
- 6. Hypersurfaces in \mathbb{R}^n and the variance of exit times for Brownian motion -with K. Kinateder, Proc. AMS **125** (1997), pages 2453-2462.
- 7. Symmetry problems arising in probability -with S. Fromm, Proc. AMS, 125 (1997), pages 3293-3298
- 8. Exit times for diffusions in Euclidean Space -with K. Kinateder and D. Miller, Probability Theory and Rel., **111** (1998), pages 469-487.
- 9. Variational principles for average exit time moments for diffusions in Euclidean space -with K. Kinateder, Proc. AMS, **127** (1999), pages 2767-2772.
- 10. Isoperimetric conditions, Poisson problems, and diffusions in Riemannian manifolds, Potential Analysis (2002) 16 pages 115-138.
- 11. Diffusions on graphs, Poisson problems and spectral geometry -with R. Meyers, Trans. AMS, 354 (2002), pages 5111-5136.
- 12. An Ito formula for domain valued process driven by stochastic flows -with K. Kinateder, Probability Theory and Rel., (2002) **124** pages 73-99.

- 13. Redefining spinors in Lorentz violating QED -with D. Colladay, Jour. Math. Physics (2002) 43, pages 3554-3564.
- 14. Dirichlet spectrum and heat content -with R. Meyers, Jour. Funct. Analysis (2003) 200, pages 150-159.
- 15. Isospectral polygons, planar graphs and heat content -with R. Meyers, Proc. AMS (2003) 131, pages 3589–3599.
- 16. Moment problems and the causal set approach to quantum gravity -with A. Ash, Jour. Math. Physics (2003) 44, pages 1666-1678.
- 17. Brownian motion, exit time moments and Weierstrass theorems -with V. de la Pena, Proc. AMS (2004) 132, pages 2465-2474.
- 18. Yang-Mills instantons with Lorentz violations -with D. Colladay, Jour. Math. Physics (2004) 45, pages 3228-3238.
- 19. Statistical mechanics and Lorentz violation -with D. Colladay, Phys. Rev. D (2004) 70, 125007.
- Recent results in geometric analysis involving probability, In: Recent Advances in Applied Probability, ed. R. Baez-Yates, J. Glaz, H. Gzyl, J. Hussler, J.L. Palacio, Springer (2005) pp 351–395.
- 21. Random partial orders, posts and discrete quantum gravity -with A. Ash, Jour. Math. Physics (2005) 46, 062502.
- Deformed instanton -with D. Colladay, In: Proceeding of the Third Meeting on CPT and Lorentz Symmetry, ed. V. Alan Kostelecky, World Scientific (2005) pp 312–318.
- 23. Nonrelativistic ideal gasses and Lorentz violation -with D. Colladay, In: Proceeding of the Third Meeting on CPT and Lorentz Symmetry, ed. V. Alan Kostelecky, World Scientific (2005) pp 264–269.
- 24. Zeta regularized determinants for conic manifolds -with. P. Loya and J. Park, Jour. Func. Analysis (2007) 242, pp 195–229.
- 25. Hitting times and inverse problems for Markov Chains -with V. de la Pena and H. Gzyl, Jour App. Prob. (2008) 45 pp 640–649.
- 26. Bose-Einstein condensation and Lorentz violation -with D. Colladay, Phys. rev. D. (2006) 73 105006.
- 27. One loop renormalization of pure Yang-Mills theory with Lorentz violation -with D. Colladay, Phys Rev. D. (2007) 75 105002.
- 28. Inverse problems for random walks on trees: network tomography, -with V. de la Peña and H. Gzyl, Stat. and Prob. Letters (2008) 78 pp 3176–3183.
- One loop renormalization of QCD with Lorentz violation -with D. Colladay, Phys Rev. D. (2008) 77 085006.
- 30. Renormalization of gauge theories with Lorentz violation -with D. Colladay, In: Proceeding of the Fourth Meeting on CPT and Lorentz Symmetry, ed. V. Alan Kostelecky, World Scientific (2008) pp 224–229.
- 31. Bose Einstein condensates and Lorentz violation -with D. Colladay, In: Proceeding of the Fourth Meeting on CPT and Lorentz Symmetry, ed. V. Alan Kostelecky, World Scientific (2008) pp 255–260.
- 32. One loop renormalization of the electroweak sector with Lorentz violation -with D. Colladay, Phys Rev. D. (2009) **79** 125019.

- 33. Factoring the dispersion relation in the presence of Lorentz violation -with D. Colladay and D. Mullins, J. Phys A. (2010) 43 275202.
- 34. Quaternion formulation of the Lorentz-violating Dirac equation -with D. Colladay and D. Mullins, In: Proceeding of the Fifth Meeting on CPT and Lorentz Symmetry, ed. V. Alan Kostelecky, World Scientific (2011) pp 199–204.
- 35. Lorentz violation and extended supersymmetry -with D. Colladay, In: Proceeding of the Fifth Meeting on CPT and Lorentz Symmetry, ed. V. Alan Kostelecky, World Scientific (2011) pp 234–239.
- 36. Vector superfields and Lorentz violation -with D. Colladay, Phys Rev. D. (2011) 83 025021.
- 37. Classical lagrangians for momentum dependent Lorentz violation -with D. Colladay, Phys. Rev. D (2012) 83 044042.
- 38. Exit time, moment problems and comparison geometry Potential Analysis (2012) DOI 10.1007/s11118-012-9318-5.
- 39. Gupta-Bleuler photon quantization in the Standard Model Extension -with D. Colladay and R. Potting, Phys. Rev. D (2014) 89 085014.
- 40. Singular Lorentz-violating Lagrangians and associated Finsler structures -with D. Colladay, Phys. Rev. D92 (2015) no.8, 085031 arXiv:1507.01018 [hep-ph].
- 41. Cherenkov Radiation with Massive, CPT-violating Photons -with D. Colladay and R. Potting, Phys. Rev. D (2016) 93 125007.
- 42. Heat content determines planar triangles -with R. Meyerson, Proc. Amer. Math. Soc. (2017) 145, 2739-2748 arXiv:1607.03351.
- 43. Torsional rigidity, isospectrality and quantum graphs -with D. Colladay and L. Kaganovskiy, Journal of Physics A (2016) 50 no. 3 arXiv:1607.05752 .
- 44. Covariant Quantization of CPT-violating Photons with D. Colladay, J. Noordmans and R. Potting, Phys. Rev. D (2017) 95 025025.
- 45. Exit time moments and eigenvalue estimates with E. Dryden and J. Langford, Bull. LMS (2017) 49 no. 3
- 46. Comparison results, exit time moments and eigenvalues on Riemannian manifolds with a lower Ricci curvature bound with D. Colladay and J. Langford, J Geom Anal (2018) arXiv:1706.01601 [math.sp]
- 47. Torsional rigidity and isospectral planar domains with J. Comer, (submitted).
- 48. Exit time moments for Brownian motion and planar triangles with Y. Stone, (in preparation).
- 49. Exit time moments for Brownian motion and sums in the spirit of Ramanujan with J. Langford, (in preparation).

PREPRINTS, MANUSCRIPTS, TECHNICAL REPORTS, AND WORK IN PROGRESS

- On the functional logdet on the space of closed curves on a sphere -with D. Burghelea, L. Friedlander, T. Kappeler, OSU Preprint #92-1, 1/92, 19 pages.
- On the functional logdet and related flows on the space of closed embedded curves on S² -with D. Burghelea, L. Friedlander, T. Kappeler, OSU Preprint #92-94, 8/92, 28 pages.

- 3. Isoperimetric conditions and diffusions in Riemannian manifolds, MSRI preprint.
- 4. Measuring channel capacity for a genetic circuit with R. S. Cox (Manuscript).
- 5. Spectral geometry, the Polya conjecture, and diffusions, Proceedings of the 34th annual Florida MAA Conference, http://www/spcollege.edu/central/maa/proceedings/2001 (electronic).
- 6. Random graphs and an approach to discrete quantum gravity Proceedings of the 37th annual Florida MAA Conference, http://www/spcollege.edu/central/maa/proceedings/2001 (electronic).
- 7. Eta invariants for quantum graphs with P. Loya, (manuscript)

ARTICLES FOR MATH REVIEWS

Forty-eight articles for Math Reviews

INVITED LECTURES

Over one hundred invited lectures. Titles and locations available on demand.

REFEREE DUTIES

Referee for twelve journals and NSF proposals in Geometric Analysis

NEW COLLEGE THESIS STUDENTS

Sixty two senior theses supervised; names and thesis titles available on demand. Twenty two capstone projects for MS in Data Science supervised.

PROFESSIONAL AFFILIATIONS

- 1. American Mathematical Society, Mathematical Association of America
- 2. American Statistical Association (2015-2018)
- 3. Council on Undergraduate Research
 - (a) Elected Chairman of Mathematics and Computer Science (2000-2002, 2002-2004).

ADMINSTRATIVE EXPERIENCE

- 1. Founding Director, Master of Science in Data Science Program (2014-2019)
 - Constructed the graduate program at New College of Florida. Duties included: securing funding and accreditation, construction of program architecture, construction of curriculum, hiring of faculty and staff, recruitment and management of external partners, admissions, marketing, budget, and program assessment.
- 2. Coordinator, LRRI-NCF Student Internship Program (2007-2018)
 - Construction/maintenance of a program involving Lovelace Respiratory Research Institute and New College of Florida. Oversaw shared faculty resources; selection and supervision of yearly cohorts of student interns.
- 3. Chair of the New College Faculty (2007-2010)
- 4. Interim Chair, Division of Natural Sciences, New College (June 2003, June 2004, July 2007)

BRAZILIAN JIU JITSU

Black belt; multiple Pan American Championships, 2010 World Senior Featherweight Champion (no-gi)

Updated: 10/17/2019

TANIA ROY

Assistant Professor, Division of Natural Sciences – Computer Science 157E Heiser Natural Sciences Complex New College of Florida | Sarasota, FL 34243 troy@ncf.edu| 864.280.1687

AREAS OF SPECIALIZATION

Human-centered computing, applied machine learning, interaction design, broadening participation in STEM through technology-rich learning environments

PROFESSIONAL EXPERIENCE Assistant Professor in Human Centered Computing August 2018 - Present New College of Florida, Sarasota, FL

EDUCATION Ph.D. in Human Centered Computing August 2018

Clemson University, Clemson, SC Dissertation Topic – Secondlook: a prototype mobile phone intervention for digital dating abuse Adviser –Dr. Larry F. Hodges

M.S. in Computer Science August 2013 Clemson University, Clemson, SC

B. Tech. in Computer Science & Engineering May 2011 *West Bengal University of Technology, India*

JOURNAL PUBLICATIONS

- Volante, M., Babu, S.V., Chaturvedi, H., Newsome, N., Ebrahimi, E., Roy, T., Daily, S.B. and Fasolino, T. (2016). Effects of Virtual Human Appearance Fidelity on Emotion Contagion in Affective Inter-Personal Simulations. *IEEE transactions on visualization and computer graphics*, 22(4), pp. 1326-1335.
- Eggert, J., Dye, C. J., Vincent, E., Parker, V., Daily, S. B., Pham, H., Watson, A. T., Summey, H. and Roy, T. Effects of viewing a preferred nature image and hearing preferred music on engagement, agitation, and mental status in persons with dementia. *SAGE Open Medicine*, January-December 2015; vol. 3, 2050312115602579.
- *3.* Daily, S.B., James, M.T., **Roy, T.,** Darnell, S.S. (2014). EngageMe: Designing A Visualization Tool Utilizing Physiological Feedback to Support instruction. *Technology, Instruction, and Learning* 2015, 10(2), pp. 107-126.

PEER REVIEWED CONFERENCE PUBLICATIONS

- *4.* **Roy, T.**, Young E*., Hodges, L.F. (2020). A second look at SecondLook: Design Iterations and Usability of Digital Dating Abuse Detection and Awareness App . *Proceedings of the International Conference on Healthcare Informatics, Dec 2020*
- 5. Hunter, J.*, Roy, T. (2020). Prototyping a Mental Health Smartphone Application. In International Conference on Human-Computer Interaction (pp. 254-267). Springer, Cham.
- 6. Roy, T., McClendon, J., Hodges, L.F. (2018). Identifying Abusive Text Messages for College-aged Women to Detect Instances of Dating Abuse. *Proceedings of the International Conference on Healthcare Informatics, New York, NY*.
- 7. **Roy, T**., McClendon, J., Daily, S.B., Hodges, L.F. (2016). SecondLook: Participatory design process to create a phone app that detects digital dating abuse. *Proceedings of the International Conference on Healthcare Informatics, Chicago, Ill.*, pp. 320-327.
- Wu, X., Bertrand, J., Armstrong, R., Ebrahimi, E., Roy, T., Dukes, L. C., Daily, S.B., Luo, J., Fasolino, T., Hodges, L. F., and Babu, S. (2014). Effects of Virtual Human Animation on Emotion Contagion in Simulated Inter- Personal Experiences. *Proceedings of IEEE Virtual Reality 2014 (IEEE VR 2014)*. (March 29-April 2, 2014, Minneapolis, MI), pp. 626 – 635.
- 9. Daily, S.B., Meyers, D., Darnell, S., **Roy, T.,** James, M.T. (2013). Understanding Privacy and Trust Issues in a Classroom Affective Computing System Development. *Human-Computer Interaction International Conference.* (July 21- 26, 2013, Las Vegas, NV, Springer, Berlin, Heidelberg). pp414-423.
- Daily, S.B., Gilbert, J.E., Eugene, Gardner-McCune, C., McMullen, K.A., Hall, P.W., Remy, S.L., Woodard, D.L., Roy, T. (2013). Alternate Pathways to Careers in Computing: Recruiting and Retaining Women Students. *Proceedings of the 2013 ASEE Annual Conference & Exposition*. (June 23-26. Atlanta, GA), pp. 23.144.1—23.144.11.
- 11. Gaurav, S., **Roy,T.,** Zeng,J., Charles,E.L., Henry,M., Han,K., Corley,C (2017). ChemAnalyzer: a text analytics platform for chemical surveillance. *ACS 2017: Text-Mining & Natural Language Processing for Chemical Information: From Documents to Knowledge* (April 2-6).

BOOK CHAPTER

1. Daily, S.B., Darnell, S., James, M., Joseph, I., Cherry, D., Porter III, J., **Roy, T**. Affective Computing: Historical Foundations, Current Applications and Future Trends. *In Affective Sciences in Human Factors and Human-Computer Interaction. Elsevier Publications.* (Dec 2017). pp 213-231.

*student author

RESEARCH POSTER PRESENTATIONS

- 1. Roy, T., Hodges, L. F., McClendon, J. (2016). Participatory design process of creating a phone application that detects digital dating abuse. *Poster presented at Carolina's Women in Computing Conference (CWIC2016).* (February 19 -20, Myrtle Beach, SC).
- 2. Roy, T., Hodges, L. F., McClendon, J. (2016). Understanding the feasibility of creating a phone application that detects digital dating abuse. *Poster accepted at the Grace Hopper Women in Computing Conference (GHC 2016).*
- Chaturvedi, H., Newsome, N., Babu, S., Luo, J., Roy, T., Daily, S.B., Bertrand, J., Fasolino, T., Ebrahimi, E. (2015). Comparative Evaluation of Stylized versus Realistic Representation of Virtual Humans on Empathetic Responses in Simulated Interpersonal Experiences. *Poster presented at IEEE Virtual Reality 2015 (IEEE VR 2015)*. (March 23-27. Arles, France).
- 4. **Roy, T.**, James, M. Gupta, A. Daily, S.B. (2013). A Participatory Design Process for Developing a Tool to Visualize Classroom Engagement. *Poster Presented at ACM Richard Tapia Celebration of Diversity in Computing Conference.* (February 7 10. Washington, D.C).

DOCTORAL CONSORTIUM PRESENTATIONS AND RESEARCH DEMONSTRATIONS

- 1. **Roy, T.,** Hodges, L. F. (2016). Detecting digital dating abuse using machine-learning techniques. *Presented at the Doctoral Consortium ACM Richard Tapia Celebration of Diversity in Computing Conference*. (September 15 17. Austin, TX).
- 2. **Roy, T.** (2016). SecondLook: Detecting digital dating abuse using machine-learning techniques. *Presented at the Doctoral Consortium in IEEE International Conference on Health Informatics.* (October 4-7 2016, Chicago, IL).
- 3. **Roy, T.** (2016). Research demos at the *IEEE Virtual Reality (IEEE VR 2016)*. (March 19-21 2016, Greenville, SC).

PANEL PRESENTATIONS

1. Dukes,L., **Roy,T.**, Grossnell,J.,Pence,T., Ebrahimi,E., McClendon,J., Hodges,.L. (2019). Leveraging Technology to Improve Healthcare. Technical Presentation: Birds of Feather Panel Presentation at ACM Richard Tapia Celebration of Diversity in Computing Conference (September 2019, San Diego, CA).

INVITED TALKS AND PRESENTATIONS

- 1. **Roy,T.** (2020). Design and Empathy: A different road in Computer Science. Code! SciGirls Camp at Mote Marine Laboratory. (To be presented March 2, 2020).
- 2. **Roy,T.** (2018). Fighting Digital Dating Abuse: The Effective Use of Technology in the Prevention of Interpersonal Violence. (Presented at Feminist Friday Lecture Series, New College of Florida, 2018)

HONORS AND AWARDS

Funding

- NSF HBCU EiR (2020) : Towards Understanding and Identifying Empathy and Uncomfortable Speech in Human Communications (Under Review as a subaward in collaboration with Howard University)
- NSF CRII:IIS:RUI (2020) : Using mobile virtual reality simulations to increase environmental stewardship and awareness amongst middle and elementary school students (Under Review)

Conference Travel Grants

- GHC Faculty Scholar October 2019
- IEEE International Conference on Health Informatics October 2016
- ACM Carolina Women in Computing (CWIC) February 2016
- Computer Research Association –Women (Grad Cohort Workshop) March 2014
- ACM Richard Tapia Celebration of Diversity in Computing Conference February 2013, September 2016
- Grace Hopper Celebration of Women in Computing October 2012

SYNERGISTIC ACTIVITIES

Institutional service

Department/Division :

- Assistant Professor in Computer Science (Visiting) February 2019 August 2019
- Assistant Professor in Computer Science (Visiting) December 2019 January 2020
- Professor in Computer Science (Tenure track Open rank) April 2019 December 2019
- Budget Committee Member (Division of Natural Sciences) October 2019 Present

College:

• Member, Institutional Review Board, New College of Florida - January 2020 - Present

Professional Service

Program Committee

- Chair Doctoral Consortium ACM Richard Tapia Celebration of Diversity in Computing, 2021
- Co-Chair Doctoral Consortium ACM Richard Tapia Celebration of Diversity in Computing, 2020
- Poster Committee Member Grace Hopper Celebration of Women in Computing Conference -2019

Reviewer

- ACM SIGCHI Paper Reviewer 2020
- ACM Interaction Design and Children (IDC) Paper Reviewer 2020

- Association for the Advancement of Artificial Intelligence (AAAI) Undergraduate Consortium Paper Reviewer – 2020
- Association for Computational Linguistics 2019
- Conference on Computational Natural Language Learning 2019, 2020
- Journal of Computer Science Education Reviewer 2021
- SIGCSE Poster Committee and Technical Panel Presentation Reviewer 2020
- Poster Committee Member and Reviewer Grace Hopper Celebration, 2019, 2020
- Association for Computational Linguistics 2019
- Conference on Computational Natural Language Learning 2019, 2020
- ACM Student Research Competition (Poster and Oral Presentations by Graduate Students) GHC 2019
- ACM Richard Tapia Celebration of Diversity in Computing Doctoral Consortium Reviewer and Panelist 2020
- ACM Richard Tapia Celebration of Diversity in Computing Doctoral Consortium Panel Reviewer 2019
- ACM Richard Tapia Celebration of Diversity in Computing scholarship reviewer -2019
- IEEE 3D User Interface Conference (Poster Reviewer) March 2016

STUDENT ADVISING

Undergraduate Thesis Sponsor

- Ty Lazarchik "Accessible Usability: Distinguishing Two Fields of Web Development" Undergraduate thesis – 2020
- Parankush Bhardwaj "Information Ecosystems: Improving Information Consumption"-Undergraduate thesis – 2020
- Paul Domke "Redesigning NCF Forum: Investigating Online Communication in a college setting" Undergraduate thesis 2020

Thesis Committee (2020)

- Jordan Deagan
- Erik Ridd
- Arianna Rodriquez
- Selena Goods
- Elan Works
- Marc Acebedo
- Benjamin Weisman
- Kyle Dennison
- Jennifer Greenberg

Research Mentor

- Eleanor Young Summer and Fall 2019
- Hunt J. Sparra 2019- Current

TEACHING

Courses Taught

- Introduction to Programming in Python Fall 2018, 2019
- Introduction to Programing in C Fall 2016, Spring 2018, 2020
- Software Engineering -Spring 2020, 2021
- Usable Privacy and Security Fall 2019
- Foundations of Human Centered Computing Fall 2018, Fall 2020
- Introduction to Augmented Reality Spring 2019
- Discrete Mathematics (Team taught) Spring 2019, 2020
- Social and Ethical Issues in Computer Science Fall 2020

New Course Development

- Software Engineering Spring 2020
- Usable Privacy and Security Fall 2019
- Foundations of Human Centered Computing Fall 2018
- Introduction to Augmented Reality -Spring 2019
- Social and Ethical Issues in Computer Science Fall 2020
- Introduction to Virtual Reality Systems Spring 2021

MEMBERSHIPS

ACM – Professional Member | November 2018 – Present ACM-SIGCHI – Member | November 2018 - Present ACM-W member | 2016 – Present ACM SIGSE member | 2019 - Present IEEE Professional Member | 2018 – Present IEEE Women in Engineering member | 2015 – 2017

Positions and Education

2019-2020	Associate Professor of Bioinformatics
	Division of Natural Sciences, New College of Florida
2013-2019	Assistant Professor of Bioinformatics
	Division of Natural Sciences, New College of Florida
2012-2013	Post-Doctoral Associate
	Department of Biological Science, Florida State University
	PI: Dr. David Gilbert (gilbert@bio.fsu.edu)
2004-2012	Ph.D., Florida State University
	Major: Molecular/Computational Biology
	Major advisor: Dr. David Gilbert (gilbert@bio.fsu.edu)
2000-2004	B.A., New College of Florida
	Major: Biology / Chemistry
	Major advisor: Dr. Amy Clore (clore@ncf.edu)

Teaching and Research Experience

Course instructor:	
2020	Foundations of Biology II, Applied Bioinformatics Laboratory,
	Data Munging and Exploratory Data Analysis
2019	Biostatistics, Principles of Bioinformatics,
	Data Munging and Exploratory Data Analysis
2018	Topics in Genomics, Foundations of Biology II,
	Analysis of Biological Datasets using R,
	Data Munging and Exploratory Data Analysis
2017	Biostatistics, Data Munging and Exploratory Data Analysis
2016	Applied Bioinformatics Laboratory, Principles of Bioinformatics
2015	Biostatistics, Applied Bioinformatics Laboratory,
	Principles of Bioinformatics, Data Munging and Exploratory Data Analysis
2014	Biostatistics, Topics in Epigenetics,
	Analysis of Biological Datasets using R
2013	Principles of Bioinformatics, Applied Bioinformatics Laboratory,
	Analysis of Biological Datasets using R
2006-2012	Research Assistant – David Gilbert Laboratory
2004-2006	Research Assistant – Curtis Altmann Laboratory
2006	Teaching Assistant – BSC3402L – Algal Genetics Laboratory
2004-2009	Teaching Assistant – BSC2010L – Biological Science I Laboratory
Peer-Reviewed Publications

- **2008** Ichiro Hiratani, **Tyrone Ryba**, Mari Itoh, Tomoki Yokochi, Michaela Schwaiger, Chia-Wei Chang, Yung Lyou, Tim M. Townes, Dirk Schübeler, and David M. Gilbert. Global Reorganization of Replication Domains During Embryonic Stem Cell Differentiation. *PLoS Biology* 6(10): e245
- **2008** Nodin Weddington, Alexander Stuy, Ichiro Hiratani, **Tyrone Ryba**, Tomoki Yokochi, and David M. Gilbert. ReplicationDomain: a visualization tool and comparative database for genome-wide replication timing data. *BMC Bioinformatics* 9: 530.
- **2009** Tomoki Yokochi, Kristina Poduch, **Tyrone Ryba**, Junjie Lu, Ichiro Hiratani, Makoto Tachibana, Yoichi Shinkai, and David M. Gilbert. G9a selectively represses a class of late-replicating genes at the nuclear periphery. *Proc Natl Acad Sci USA*. 106: 19363.
- **2009** Ichiro Hiratani, **Tyrone Ryba**, Mari Itoh, Joy Rathjen, Michael Kulik, Bernadett Papp, Kathrin Plath, Stephen Dalton, Peter D. Rathjen, and David M. Gilbert. Genome-wide dynamics of replication timing revealed by in vitro models of mouse embryogenesis. *Genome Research* 20(2):155-69.
- **2010 Tyrone Ryba,** Ichiro Hiratani, Junjie Lu, Mari Itoh, Michael Kulik, Jinfeng Zhang, Stephen Dalton, and David M. Gilbert. Evolutionarily conserved replication timing profiles predict long-range chromatin interactions and distinguish closely related cell types. *Genome Research*, 20(6):761-70.
- **2010** David M. Gilbert, Shin-ichiro Takebayashi, **Tyrone Ryba**, Junjie Lu, Benjamin D. Pope, Korey A. Wilson and Ichiro Hiratani. Space and time in the nucleus: developmental control of replication timing and chromosome architecture. *Cold Spring Harbor Symposia on Quantitative Biology*, 75:143-53
- **2010 Tyrone Ryba,** Dana Battaglia, Benjamin D. Pope, Ichiro Hiratani, and David M. Gilbert. A complete protocol for genome-scale analysis of replication timing in mammalian cells. *Nature Protocols Network*, URL: http://www.nature.com/protocolexchange/protocols/1888
- **2011 Tyrone Ryba,** Ichiro Hiratani, Mari Itoh, Jinfeng Zhang, and David M. Gilbert. Replication timing: a fingerprint for cell identity and pluripotency. *PLoS Comp. Biol.* 7(10):e1002225
- **2011 Tyrone Ryba,** Dana Battaglia, Benjamin D. Pope, Ichiro Hiratani, and David M. Gilbert. Genome-Scale Analysis of Replication Timing: from Bench to Bioinformatics. *Nature Protocols*, 6(6):870-95.
- **2011** Benjamin D. Pope, Tsumagari, Dana Battaglia, **Tyrone Ryba**, Ichiro Hiratani, Melanie Ehrlich, and David M. Gilbert. DNA replication timing is maintained genome-wide in primary human myoblasts independent of D4Z4 contraction in FSH muscular dystrophy. *PLoS One* 6(11):e27413
- **2012** Shin-ichiro Takebayashi, Vishnu Dileep, **Tyrone Ryba**, Jonathan Dennis, and David M. Gilbert. Chromatin-interaction compartment switch at developmentally regulated chromosomal domains reveals an unusual principle of chromatin folding. *Proc Natl Acad Sci USA*. 109(31): 12574-9
- 2012 Tamir Chandra, Kristina Kirschner, Jean-Yves Thuret, Benjamin D. Pope, Tyrone Ryba, Scott Newman, Kashif Ahmed, Shamith A. Samarajiwa, Rafik Salama, Thomas Carroll, Rory Stark, Rekin's Janky, Masako Narita, Lixiang Xue, Agustin Chicas, Sabrina Nũnez, Ralf Janknecht, Yoko Hayashi-Takanaka, Michael D. Wilson, Aileen Marshall, Duncan T. Odom, M. Madan Babu, David P. Bazett-Jones, Simon Tavaré, Paul A.W. Edwards, Scott W. Lowe, Hiroshi Kimura, David M. Gilbert, Masashi Narita. Independence of Repressive Histone Marks and Chromatin Compaction during Senescent Heterochromatic Layer Formation. *Molecular Cell* 47(2):203-14.

- **2012 Tyrone Ryba,** Dana Battaglia, Bill H. Chang, James W. Shirley, Quinton Buckley, Benjamin D. Pope, Meenakshi Devidas, Brian J. Druker, and David M. Gilbert. Abnormal Developmental Control of Replication Timing Domains in Pediatric Acute Lymphoblastic Leukemia. *Genome Research*, 22(10):1833-44.
- **2012** Benjamin D. Pope, Tamir Chandra, Quinton Buckley, Matthew Hoare, **Tyrone Ryba**, Frances K. Wiseman, Anna Kuta, Michael D. Wilson, Duncan T. Odom, and David M. Gilbert. Replication-timing boundaries facilitate cell-type and species-specific regulation of a rearranged human chromosome in mouse. *Hum. Mol. Genet*, 21(19):4162-70.
- **2012** Mouse ENCODE Consortium. An encyclopedia of mouse DNA elements (Mouse ENCODE). *Genome Biol.* 13(8):418.
- **2012** Shin-ichiro Takebayashi, **Tyrone Ryba**, and David M. Gilbert. Developmental control of replication timing defines a new breed of chromosomal domains with a novel mechanism of chromatin unfolding. *Nucleus*, 3(6):500-7.
- **2013** Shin-ichiro Takebayashi, Ienglam Lei, **Tyrone Ryba**, Takayo Sasaki, Vishnu Dileep, Dana Battaglia, Xiaolin Gao, Peng Fang, Yong Fan, Miguel A. Esteban, Jiong Tang, Gerald R. Crabtree, Zhong Wang, and David M. Gilbert. Murine esBAF chromatin remodeling complexes are necessary to maintain and reprogram pluripotency-specific replication timing of select replication domains. *Epigenetics & Chromatin*, 13;6(1):42.
- **2014** Mouse ENCODE Consortium (co-first author). A comparative encyclopedia of DNA elements in the mouse genome. *Nature*, 515(7527):355-64.
- **2014** Yong Cheng*, Zhihai Ma*, Mouse ENCODE Consortium, *et al*. Principles of regulatory information conservation between mouse and human. *Nature*, 515(7527):371-6.
- 2014 Benjamin D. Pope, Tyrone Ryba (co-first authors), Vishnu Dileep, Feng Yue, Weisheng Wu, Olgert Denas, Daniel L. Vera, Yanli Wang, R. Scott Hansen, Theresa K. Canfield, Robert E. Thurman, Yong Cheng, Günhan Gülsoy, Jonathan H. Dennis, Michael P. Snyder, John A. Stamatoyannopoulos, James Taylor, Ross C. Hardison, Tamer Kahveci, Bing Ren, and David M. Gilbert. Topologically associating domains are stable units of replication-timing regulation. *Nature*, 515(7527):402-5.
- **2017** Mathewos Tessema, Christin M. Yingling, Maria A. Picchi, Guodong Wu, **Tyrone Ryba**, Yong Lin, Aaron O. Bungum, Eric S. Edell, Avrum Spira, Steven A. Belinsky. ANK1 Methylation regulates expression of MicroRNA-486-5p and discriminates lung tumors by histology and smoking status. *Cancer Letters* 410:191-200.
- **2019** <u>Hannah Voic</u>, Xiuying Li, Jun-Ho Jang, Chunbin Zou, Jonathan K. Alder, Rama K. Mallampalli, **Tyrone Ryba**, Toru Nyunoya. (co-corresponding author) RNA sequencing identifies common pathways between cigarette smoke exposure and replicative senescence in human airway epithelia. *BMC Genomics* 20 (1), 22

Manuscripts in preparation and review (undergraduate mentees)

Athena Rycyk, Jessica Skinner, **Tyrone Ryba**, and Nicola Erdsack. Algae growth on wild Florida manatees. *In preparation.*

Shuguang Leng, **Tyrone Ryba** (co-first authors), Guodong Wu, <u>Philip Pope</u>, <u>Seth Hearld</u>, Timothy Duff, and Steven Belinsky. Germline meQTLs are associated with promoter hypermethylation risk in lung carcinoma. *In preparation*.

Jun-Ho Jang, **Tyrone Ryba** (co-first authors), Hitendra Chand, Shannon Bruse, Melanie Doyle-Eisele, Christopher Royer, Jacob McDonald, Yong Lin, Aloysius Klingelhutz, Yohannes Tesfaigzi, and Toru Nyunoya. NEDD1 induced by cigarette smoke exposure and influenza virus infection promotes airway epithelial cell senescence. *In preparation*.

Shin-ichiro Takebayashi, **Tyrone Ryba**, <u>Kelsey Wimbish</u>, Kenji Kuriya, Saori Takahashi, Shin Ogata, Ichiro Hiratani, Katsuzumi Okumura, Masaki Okano, and Masato Ogata. The

role of mammalian DNA methyltransferases in the regulation of temporal order of DNA replication. *In preparation.*

Other publications and coverage

- **2016 Tyrone Ryba**. "Internships a collaborative effort." *Nimbe* <u>https://nimbe.ncf.edu/the-ncflrrimrn-collaborative-internship-program/</u>
- 2016 David Gulliver. "Internships on the cutting edge." Nimbe <u>https://nimbe.ncf.edu/1348-2/</u>
- **2017** Alyson Gamble, Amelia Kallaher, <u>Neal Lacey</u>, Alexandra Maass, <u>Caitlyn Ralph</u>, **Tyrone Ryba**, and <u>Mai Tanaka</u>. Chapter 12. Harnessing the Winds: Collaboration and the Aeolus Undergraduate Research Journal. *Undergraduate Research and the Academic Librarian: Case Studies and Best Practices*, Chicago, IL: ACRL

Issued Patents

- **2014** David M. Gilbert and **Tyrone Ryba**. Replication Timing Profiles for Leukemia and other Cancers. U.S. Letters Patent #8,725,423.
- **2014** David M. Gilbert, **Tyrone Ryba**, and Ichiro Hiratani. Method for Identifying Cells Based on DNA Replication Timing Profiles. *U.S. Letters Patent # 8,728,979*.
- **2016** David M. Gilbert, **Tyrone Ryba**, Jinfeng Zhang. Fingerprint for Cell Identity and Pluripotency. U.S. Letters Patent #9,245,090.
- **2017** David M. Gilbert, **Tyrone Ryba**, Ichiro Hiratani. Method for Identifying Cells Based on DNA Replication Domain Timing Profiles. *U.S. Letters Patent #9,574,231.*

Awards and Distinctions

- 2000 Advanced Placement Laureate Certificate
- 2000-2004 Florida Bright Futures Academic Scholarship
- **2010** Margaret Y. Menzel Award for outstanding progress in research

Presentations and Conferences

- **2004** Poster "Reverse-Engineering Gene Networks from Microarray Data." *National Conference on Undergraduate Research*, Purdue University.
- **2008** Poster "Replication Timing as a Fingerprint for Stem Cell Identity." 1st Southeast Stem Cell Consortium Workshop, University of Georgia.
- **2009** Talk "Replication Timing as an Epigenetic Fingerprint for Stem Cell Identity." *Eukaryotic DNA Replication and Genome Maintenance,* Cold Spring Harbor Laboratory.
- **2009** Poster "Conserved Genome-Wide Replication Timing Profiles Between Human Embryonic Stem Cells and Mouse Epiblast Stem Cells." 3rd NIGMS Workshop on Human Embryonic Stem Cell Research, National Institutes of Health.
- **2009** Talk "Conserved Genome-Wide Replication Timing Profiles Between Human Embryonic Stem Cells and Mouse Epiblast Stem Cells." 2nd Southeast Stem Cell Consortium Workshop, University of Georgia.

- **2010** Poster "Evolutionarily conserved replication timing profiles predict long-range chromatin interactions and distinguish closely related cell types." *3rd Southeast Stem Cell Consortium Workshop*, Vanderbilt University.
- 2011 Poster "Replication Timing: A Fingerprint for Cell Identity and Pluripotency." 5th NIGMS Workshop on Human Embryonic Stem Cell Research, National Institutes of Health. Presented by DM Gilbert.
- **2011** Talk "Replication Timing Fingerprints Identify Sites of Large Scale Chromatin Deregulation in Pediatric Acute Lymphoblastic Leukemia." Basic Biology of Human Embryonic Stem Cells Retreat, Reynolds Plantation.
- **2012** Talk "Integration of functional elements across replication timing boundaries." ENCODE/modENCODE AWG/PI meeting, May 2012.
- **2013** Talk "The origins of cell fate: fingerprints of development and disease in the replication timing program." New College of Florida.
- **2014** Attendance Second Annual C.W. Bill Young Federal R&D Agency Workshop. U.S. Capitol, Washington, D.C.
- **2014** Poster "New College and the Lovelace Respiratory Research Institute: Lessons learned through collaborative summer internships." Florida Statewide Symposium on Engagement in Undergraduate Research, University of Central Florida.
- **2014** Talk "Conserved Units of Genome Regulation in Development and Disease." ARCS Conference, New College of Florida.
- **2015** Invited Talk "Conserved connections in development, disease, and genome architecture", Sigma Xi College Program Series, Eckerd College.

Collaborative presentations

2017 Toru Nyunoya, Jun-Ho Jang, Hannah Voic, Tyrone Ryba, Rama Mallampalli, poster – "Gene Expression Analysis to Identify Common Pathways Between Cigarette Smoke Exposure and Replicative Senescence", American Thoracic Society International Conference, 2015.

Student presentations

- **2015** Neal Lacey, poster "The Endoplasmic Reticulum (ER) Anchorage Protein Bcl-2 Interacting Killer (Bik) Causes Calcium Release In Human Airway Epithelial Cels (HAECs)." American Thoracic Society International Conference, 2015.
- **2015** Shane Caldwell, poster "Characterization of the Oxidative Stress Response of P53 Arg Variant." American Thoracic Society International Conference, 2015.
- **2015** Dario Mitchell, poster "Gene Expression and Pathway Analysis of COPD in TCGA Lung Cancer Patients." American Thoracic Society International Conference, 2015.
- **2015** Lucia Guatney, talk "Bioinformatic Approaches to Microsatellite Discovery and Primer Design in the Dakota Skipper Genome." New Scholars New College 2015, New College of Florida.
- **2015** Jonathan Niles, talk "Crumble into Cancer: Fragility and Disease in Human Genome Architecture." New Scholars New College 2015, New College of Florida.
- **2018** Bethany Wilson, Eleni Spanolis, Hope Sparks, Olivia Lowrey, talk "*Aeolus* Undergraduate Research Journal" Florida Collegiate Honors Council Conference 2018, Ft. Myers, FL.

Students Mentored

Academic years (NCF) **2019-2020** Destin Huebner, thesis: *Effects of Aflatoxin Production in Nuruk Fermentation* Sydney Rosenthal, thesis: Topological domains in cancer genome architecture 2018-2019 Seth Hearld, thesis: Genome-wide association studies of lung carcinoma 2017-2018 Justina Mei-Jing Bernard, thesis computation: A comparative analysis: recapture rates between the NOAA Gulfspan Survey (2000-2016) and blacktip sharks (Carcharhinus limbatus) in Terra Ceia Bay and Sarasota Bay, Florida Gavin Zitman, thesis: DNA microarrays: applications and prospects in precision medicine. **2016–2017** Kelsey Wimbish, thesis: Analysis of changes in replication timing and H3K27me3 localization in Dnmt mutants. Hannah Carlo, thesis: Cancer immunosurveillance evasion: its comprehensive historical context and correlations with outcome. Peter Gui, thesis: A network approach to bioinformatic data analysis. Michael Bailey, thesis: The antidepressant effect of serotonin uptake inhibition. 2015-2016 Shane Caldwell, Hannah Voic, Neal Lacey, Juan Gonzalez, Peter Gui. Shane Caldwell, thesis: The P53Arg variant is associated with increased mucous production and breakdown of tight junctions in human bronchial epithelial cells. Hannah Voic, thesis: Gene expression analysis to investigate connections between

> cigarette smoke exposure and cellular senescence. Neal Lacey, thesis (co-sponsored with Prof. Amy Clore): The BIK picture: reduced DAPK expression in BMF-deficient airway epithelial cells prevents BIK-mediated calcium release and cell death.

Juan Gonzalez, thesis: *Molecular signaling in plant immunity through promoter expression analysis and quantitative proteomics*

 2014–2015 Shane Caldwell, Dario Mitchell, Neal Lacey, Jonathan Niles, thesis: Crumble into cancer: fragility and disease in human genome architecture. Benjamin Ringel, thesis: Creation of a semi-automated pipeline for differential

gene expression analysis and application to mouse lung adenocarcinoma. Lucia Guatney, thesis (co-sponsored with Prof. Emily Saarinen): Bioinformatic approaches to microsatellite discovery and primer design in the Dakota Skipper genome.

2013–2014 Phillip Pope, thesis (co-sponsored with Prof. Patrick McDonald): *Genetic* determinants for the epigenetic silencing of tumor suppressor genes in lung cancer. Steven Machusko; thesis (co-sponsored with Prof. Patrick McDonald): Analysis of Copy Number Variation Association with GWAS Methylation Data.

Summers (NCF/LRRI internship program)

- **2014** Benjamin Ringel, Shane Caldwell, Dario Mitchell, Neal Lacey, Wiley Corning, Bradley Baker, Nick Abboud
- **2015** Shane Caldwell, Hannah Voic, Dario Mitchell, Neal Lacey, Bradley Baker, Caitlyn Ralph, Nikolas Wojtalewicz, Nathan Dyjack
- **2016** Seth Hearld, April Myers, Katherine Diamond, Caitlyn Ralph, Nikolas Wojtalewicz, John Cook, Jeremy Johnson

Institutional Service

- 2013 Search committee: Visiting Assistant Professor of Computational Science
- **2014** NCF Masters in Computational Data Science program committee; Subcommittees: Course planning, Comparable programs, Computer Science AOC
- **2014** Visits to Statistics and Biostatistics departments at the University of Florida and FSU with Pat McDonald, for planning and recruitment in Data Science program
- 2014 Search committee: Visiting Assistant Professor of Plant Biology
- 2014 Search committee: Assistant Professor of Plant Biology
- 2014 Search committee: Applied Statistics (junior level)
- 2014 Search committee: Applied Statistics (senior level)
- 2014 Ad hoc committee on the New College Diploma and Seal
- 2014 Alternate to the Educational Policy Committee
- 2014 Biology External Program Review
- 2015 New College Scholarship Committee
- **2015** Search committee: Assistant Professor of Statistics
- **2015** New College liaison and representative to SSERCA (Sunshine State Education & Research Computing Alliance)
- 2016 New College Scholarship Committee (Spring)
- 2016 Educational Policies Committee (EPC)
- 2016 Authored AOC effectiveness assessment and improvement plan for Biology discipline
- 2016 Search committee: Assistant Professor of Statistics (x2)
- **2016** New College Scholarship Committee (Fall)
- 2017 Educational Policies Committee (EPC)
- 2018 Educational Policies Committee (EPC)
- 2018 Liberal Arts Curriculum Committee (LAC)
- 2019 Provost's Advisory Committee (PAC)
- 2019 Liberal Arts Curriculum Committee (LAC)
- 2020 Data Science Admissions Committee
- 2020 Liberal Arts Curriculum Committee (LAC)
- 2020 Provost's Advisory Committee (PAC)

Other Activities and Service

- 2009 Cell and Molecular Biology graduate student representative for IGP faculty search
- 2014- Manuscript review for Bioinformatics (Oxford)
- **2014** Interview with ABC7 News on possible local cancer cluster (Suncoast, Sarasota and Manatee Counties)
- 2016- Manuscript review for BMC Bioinformatics

Andrey Skripnikov

Assistant Professor at New College of FL 5800 Bay Shore Rd, Sarasota, FL 34243 Analytics Blog: Github Account: askripnikov@ncf.edu www.linkedin.com/in/andrey-skripnikov-489158a4 www.usdandres.weebly.com/analytics-blog www.github.com/UsDAnDreS?tab=repositories

January 5, 2021

Gainesville, FL

2012 - 2017

Education

_	University	of	Florida
---	------------	----	---------

- PhD in Statistics
 - Dissertation title 'Topics in Joint Estimation of Vector Autoregressive Models'
 - Passed two comprehensive qualifying exams during first and second years of the program.

_	University of Florida	Gainesville, FL
•	Master in Statistics	2012 - 2015
_	Lomonosov Moscow State University	Moscow, Russia
•	Bachelor of Science in Applied Mathematics and Computer Science	2007 - 2012

Employment

_	Assistant Professor in Applied Statistics	Sarasota, FL
•	New College of Florida	2019-now

- Conducting research in areas of high-dimensional data analysis, time series, sports analytics and gene expression data.

- Serving as both graduate and undergraduate-level courses in data science and statistics.

- Contributing to creation of the Statistics major at the college.

	Lecturer/Research Associate in Data Science	Houston, TX
•	University of Houston	2017-2019

- Conducting research in areas of neural network modeling for high-dimensional neuroimaging time series data, predictive analytics.

- Serving as instructor for both graduate and undergraduate-level courses in data science.

- Serving on the Math department committee for the undergraduate option in Data Science. Helping develop courses and the overall curriculum.

- Organizing "Data Science in Sports" weekly club meetups for graduate students.

- Participating in workshops organized by Data Science Institute, helping bring in interesting speakers to University of Houston.

Sports Columnist at "The Daily Cougar".

University of Houston

- http://thedailycougar.com/byline/andrey-skripnikov/

- Led "By the numbers" column for Houston Cougars football team.

- Wrote weekly statistical reports for Houston Rockets NBA team.

Houston, TX

Fall, 2017

•

Teaching

Employer: University of Florida; Address: 102 Griffin-Floyd Hall, Gainesville, FL 32611 2013-2017

- Conducted research in areas of multivariate time series analysis and regularized estimation. Worked with econometric and neuroimaging data.

- Taught and graded labs three times a week for an introductory course in statistics. Tutored students in preparation for exams.

Advanced Modeling and Time Series Analysis graduate-level course New College of FL	se Sarasota, FL Fall, 2020
- Fully developing the course structure from scratch (slides, homeworks, pro	jects and exams).
- Teaching lectures, grading exams, conducting project assignments for a cla	ass of 13 students.
Statistical Inference graduate-level sequence New College of FL	Sarasota, FL Fall, 2019 - now
- Fully developing the course structure from scratch (slides, homeworks, pro	jects and exams).
- Teaching lectures, grading exams, conducting project assignments for a cla	ass of 14 students.
Statistical Learning undergraduate-level course New College of FL	Sarasota, FL Fall, 2019
- Fully developing the course structure from scratch (slides, homeworks, pro	jects and exams).
- Teaching lectures, grading exams, conducting project assignments for a cla	ass of 8 students.
Machine Learning graduate-level course University of Houston	Houston, TX Spring, 2019
- Fully developing the course structure from scratch (slides, homeworks, pro	jects and exams).
- Teaching lectures, grading exams, conducting project assignments for a cla	ass of 25 students.
Data Science & Machine Learning undergraduate courseUniversity of HoustonFal	Houston, TX l, 2018 - Spring, 2019
Fully developed the course structure from scratch (slides, homeworks, labsTeaching lectures, grading exams, conducting labs and project assignments	, projects and exams). for class of 80 students.
Statistical Computing graduate-level course University of Houston	Houston, TX Fall, 2017-2018
Fully developed the course structure from scratch (slides, homeworks, projTeaching lectures, grading exams, conducting project assignments for a cla	ects and exams). ass of 30 students.
Biomedical Modeling graduate-level course University of Houston	Houston, TX Spring, 2018
- Fully developed the course structure from scratch (slides, homeworks, and	exams).

- Teaching lectures, grading exams and homeworks.

Teaching Assistant for online course in Introductory StatisticsGainesville, FLUniversity of FloridaSummer, 2017

- Performed and recorded online tutoring sessions for a class with enrollment of 180 students.

- Graded project assignments.
- Teaching Assistant for Introductory Statistics courseUniversity of Florida20

Gainesville, FL 2013 - 2014; 2015- 2016.

- Taught and graded laboratory work for three sections of 40 students each.
- Tutored students in preparation for exams for this course with total enrollment of 1800 students.

Awards, Grants & Honours

Graduate School Fellow (25000\$ per year) 2012-2016 ASA Florida Chapter Annual Meeting Award (awarded to five best speakers, 100\$) 2016

Research interests

Applied statistics, time series analysis, high-dimensional data, regularized estimation, neural networks, graphical statistics. Applications to econometrics, neuroimaging, marketing and sports.

Publications

- Skripnikov, A.V., G. Michailidis (2019), "Regularized Joint Estimation of Related Vector Autoregressive Models" by "Computational Statistics and Data Analysis".
- Skripnikov, A.V., G. Michailidis (2018), "Joint Estimation of Multiple Network Granger Causal Models" by "Econometrics and Statistics".
- Skripnikov, A.V. (2017), "Topics in Joint Estimation of Vector Autoregressive Models" by University of Florida, Statistics Thesis, Ph.D.
- Skripnikov, A.V., G. Michailidis (2016), "Estimation of Multi-Granger Network Causal Models" by JSM Proceedings, Section on Statistical Learning and Data Science. Chicago, IL: American Statistical Association.

Papers Under Review/In The Works.

- Skripnikov, A.V., N. Wagner, J. Shafer, "Using Localized Twitter Activity for Red Tide Impact Assessment."
- Skripnikov, A.V., "Adjustment of Sports Rankings and Predictive Features via Generalized Linear Models with Applications to College Football"

Presentations & Posters

- Skripnikov, A.V., Nathaniel Wagner, "Twitter Analytics for Florida Red Tide Impact Assessment"
 - On-demand presentation for National Coastal Estuarine Virtual Summit 2020.
- Skripnikov, A.V., "Estimation of Multi-Granger Network Causal Models" :

- Contributed paper at Joint Statistical Meetings (2016), Section on Statistical Learning and Data Science. Chicago, IL;

- Poster at Data Science and Statistical Learning Conference (2016), UNC Chapel Hill, NC;
- Poster at University of Florida Informatics Institute Symposium (2016), Gainesville, FL;
- Speed talk and poster at ASA Florida Chapter Meeting (2016), FSU, Tallahassee, FL;
- Talk and poster at University of Florida Informatics Institute Symposium (2015), Gainesville, FL;

- Contributed paper at Joint Statistical Meetings (2015), Section on Business Analytics and Financial Econometrics. Seattle, WA;

- Skripnikov, A.V., "Joint Estimation of Panel VARs Sharing Common Structure"
 Contributed paper at ENAR Spring Meeting (2017), Section on Graphical Models and Statistical Graphics, Washington, DC.
- Skripnikov, A.V., "Topics in Joint Estimation of Vector Autoregressive Models" - Dissertation defense at Statistics Department (2017), University of Florida, Gainesville;

Funding

- National Coastal Estuarine Virtual Summit 2020 500\$ by Tampa Bay Estuary program, for the conference and Twitter Premium services.
- ENAR Spring Meeting in Washington, DC, March 2017 Awarded 880\$ by advisor Dr. Michailidis
- JSM in Chicago, IL, July 2016 Awarded 1000\$ by Graduate Committee, Statistics Department and advisor Dr. Michailidis
- Data Science Conference at UNC Chapel Hill, NC, June 2016 Awarded 800\$ by UNC Chapel Hill.
- ASA Florida Chapter Meeting in Tallahassee, February 2016 Awarded 160\$ by College Graduate Committee
- JSM in Seattle, WA, August 2015 Awarded 1100\$ by Graduate Committee, Statistics Department and advisor Dr. Michailidis.

NECMETTIN YILDIRIM Division of Natural Sciences, New College of Florida 5800 Bay Shore Road, Sarasota, FL 34243 Phone: (941) 487 4214, Email: nyildirim@ncf.edu Web: https://myncf.ncf.edu/web/nyildirim/

EDUCATION

<i>Ph.D. Applied Mathematics</i> Ataturk University, Erzurum, Turkey	1996-2000
Thesis title: <i>Kinetic and metabolic control analysis of multi-enzyme syste</i> <i>combination of symbolic and numerical computation techniques</i> Supervisor: Prof. Dr. Mustafa Bayram	ms in biochemistry by
M.Sc. Applied Mathematics Dumlupinar University, Kutahya, Turkey Thesis title: Dimension reduction by principle components analysis in mul and an application Supervisor: Prof. Dr. Ibrahim Gupey	1993-1996 Itivariate data analysis
B.Sc. Mathematics Education Middle East Technical University, Ankara, Turkey	1987-1992
PROFESSIONAL EXPERIENCE	
<i>Professor</i> Soo Bong Chae Chair of Applied Mathematics Division of Natural Sciences New College of Florida	2017-Present
<i>Associate Professor</i> Soo Bong Chae Chair of Applied Mathematics Division of Natural Sciences New College of Florida	2012-2016
<i>Assistant Professor</i> Soo Bong Chae Chair of Applied Mathematics Division of Natural Sciences New College of Florida	2006-2012
<i>Postdoctoral Associate</i> Department of Mathematics University of North Carolina at Chapel Hill Supervisor: Prof. Dr. Timothy C. Elston	2003-2006
<i>Postdoctoral Fellow</i> Center for Nonlinear Dynamics in Physiology & Medicine	2001-2002

McGill University, Canada Supervisor: Prof. Dr. Michael C. Mackey

Researcher Computer Science Application and Research Center Ataturk University, Turkey

RESEARCH INTEREST

Mathematical biology, dynamical systems, delay differential equations, computer algebra, gene regulation, signal transduction pathways and stochastic simulation

TEACHING EXPERIENCE

New College of Florida 2019-2020	Ordinary Differential Equations Probability I Probability II Mathematics Seminar I
New College of Florida	Numerical Methods Mathematical Modeling Mathematics Seminar II
2018-2019	Ordinary Differential Equations Probability Mathematics Seminar I
	Linear Algebra Linear Programming Mathematics Seminar II
New College of Florida 2017-2018	Ordinary Differential Equations Probability Mathematics Seminar I
	Introduction to Numerical Methods Mathematical Modeling Mathematics Seminar II
New College of Florida 2016-2017	Ordinary Differential Equations Systems Biology Mathematics Seminar I
	Linear Algebra Mathematical Modeling Mathematics Seminar II

1998-2001

2015-2016	Ordinary Differential Equations Linear Algebra Mathematics Seminar I
	Introduction to Numerical Methods Mathematical Modeling Mathematics Seminar II
2014-2015	Ordinary Differential Equations Linear Algebra Mathematics Seminar I
	Introduction to Numerical Methods Mathematical Modeling Mathematics Seminar II
2013-2014	Ordinary Differential Equations Probability Mathematics Seminar I
	Introduction to Numerical Methods Mathematical Modeling Mathematics Seminar II
2012-2013	Ordinary Differential Equations Systems Biology Mathematics Seminar I
	Mathematical Statistics Mathematical Modeling Mathematics Seminar II
2011-2012	Systems Biology Ordinary Differential Equations Mathematics Seminar I
	Introduction to Numerical Methods Mathematical Modeling Mathematics Seminar II
2010-2011	Mathematical Modeling Ordinary Differential Equations Mathematics Seminar I
2009-2010	Systems Biology Calculus I Mathematics Seminar I
	Calculus II Section I Calculus II Section II Mathematics Seminar II

2008-20	009	Ordinary Differential Equations Advanced Linear Algebra Mathematics Seminar I
2007-20	008	Linear Algebra Mathematical Modeling Mathematics Seminar II Calculus I Section 1 Calculus I Section 2 Mathematics Seminar I
		Linear Algebra Mathematical Modeling Mathematics Seminar II
2006-20	007	Ordinary Differential Equations Discrete Dynamical Systems Mathematics Seminar I
		Computational Linear Algebra Mathematical Modeling Mathematics Seminar II
Univers	sity of North Ca	rolina at Chapel Hill
Spring	2006	Introduction to Differential Equations
Spring	2005	Introduction to Differential Equations
Fall	2004	Linear Algebra
Fall	2003	Calculus of functions with one variable

THESES SPONSORED AT NEW COLLEGE OF FLORIDA

- Mathematical Modeling of Dual Regulation of Yeast Pheromone Response by Sst2 Protein(2019-2020) Student: Cassandra Azeredo_Tseng, Role:Sponsor. Current: Graduate Student at University of Chicago
- Paths to Success: The Relationship Between Health and Education in Developing Countries(2017-2018)
 Student: Cheikhou Akhmed Kane, Role:Co-Sponsor.
- 3. Mathematical Modeling of Protein Synthesis with Autoregulation (2016-2017) *Student: Blaise DeFranco, Role: Sponsor.*
- 4. Mathematical modeling of MAPK dynamics and signal adaptation (2015-2016) *Student: Nathan T. Dyjack, Role: Sponsor.* Current: Researcher at Bioinformatics Group at National Jewish Health, Denver, CO
- Delay differential equation model for G-protein pathway dynamics (2015-2016) *Student: Alexander R. Galarce, Role: Sponsor* Current: Research Associate at Sage Renewable Energy Consulting, San Rafael, CA
- 6. Experimental investigations and mathematical modeling of the Briggs-Rauscher oscillating reaction (2015-2016)

Student: Jessica Paredes, Role: Co-sponsor, Sponsor: Prof. Steven Shipman Current: PhD Student at Vanderbilt University

- 7. A mathematical model relating soil organic matter decomposition to microbial community dynamics (2013-2014) *Student: Vanessa M. Chastain, Role: Co-sponsor, Sponsor: Prof. Pat McDonald,* Current: Catastrophe Modeling Analyst at JLT Re (North America) Inc., Philadelphia, PA
- 8. Mathematical modeling of pacific pink salmon population dynamics(2011-2012) *Student: Tania Harrison, Role: Sponsor* Current: Virtual School of Excellence, Fort Pierce, FL
- 9. A mathematical modeling approach to foraging Ostracod populations (2010-2011) *Student: John Correa, Role: Co-sponsor, Sponsor: Prof. Sandra Gilchrist* Current: Graduate Student at School of Law at Northwestern University
- 10. Mathematical models in population dynamics (2010-2011) Student: Alexander Salisbury, Role: Sponsor Current: Software developer at Shopify
- Sensitivity analysis of biochemical networks: Computer algebra application to E. coli tryptophan operon (2010-2011) *Student: Casey Henderson, Role: Sponsor* Current: New College Child Care
- Mathematical modeling and optimal experimental design in systems biology (2010-2011)
 Student: Jonathan Statz, Role: Sponsor
 Current: Graduate Students at Florida State University
- 13. Dynamics of an analogue of the quadratic family on SU(2) (2009-2010) *Student: John Emanuello, Role: Co-sponsor, Sponsor: Prof. Pat McDonald* Current: Graduate Students at Florida State University

JOURNAL PUBLICATIONS

- 1. **Yildirim N.** and Ay A.(2016), Feedback regulation of yeast G-protein cycle: A delay differential equation model (In preparation)
- Dyjack N.⁺, Azeredo-Tseng C.⁺ and Yildirim N., Mathematical modeling reveals differential regulation of MAPK activity by phosphatase proteins in the yeast pheromone response pathway, Journal Molecular BioSystems, 13(7), 1323-1335
 ⁺Undergraduate student author mentored by Necmettin Yildirim
- 3. **Yildirim N.**, Aktas M.E., Ozcan S.N., Akbas E. and Ay A.(2016), Differential transcriptional regulation by alternatively designed mechanisms: A mathematical modeling approach, *In Silico Biology*, 13, 1-33
- 4. Ay A., Wilner N. and **Yildirim N.**(2015), Mathematical modeling deciphers the benefits of conserved alternatively designed activation and inhibition mechanisms, *Molecular BioSystems*, 11(7), 2017-30

- 5. Ay A. and **Yildirim N.**(2014), Dynamics matter: differences and similarities between alternatively designed mechanisms, *Molecular BioSystems*, 10(7), 1948-1957
- 6. Aydemir A., **Yildirim N.**, Hitzmann B. and Scheper T.(2013), A new mathematical model for the enzymatic kinetic resolution of racemates, *Journal of Mathematical Chemistry*, 51(6), 1532-1547
- Yildirim N., Hao N., Nagiec M.J., Parnell S.C., Errede B., Dohlman H.G. and Elston T.C.(2012), Combined computational and experimental analysis reveals mitogenactivated protein kinase-mediated feedback phosphorylation as a mechanism for signaling specificity, *Molecular Biology of the Cell*, 23(19), 3899-3910
- 8. Yildirim N.(2012), Mathematical modeling of the low and high affinity arabinose transport systems in Escherichia coli, *Molecular BioSystems*, 8(4), 1319-1324
- 9. Yildirim N. and Kazanci C.(2011), Deterministic and stochastic simulation and analysis of biochemical reaction networks: The lactose operon example, *Methods in Enzymology*, 487, 371-395
- Yildirim N. and Statz J.K.⁺(2011), Analysis of biochemical chain reactions with negative feed-forward and feedback loops, *Journal of Mathematical Chemistry*, 49(2), 576-591

⁺Undergraduate student author mentored by Necmettin Yildirim

- Yildirim N., Violin J.D., DiPilato L.M., Elston T.C., Zhang J. and Lefkowitz R.J.(2008), β- adrenergic receptor signaling and desensitization elucidated by quantitative modeling of real-time cAMP dynamics, *Journal of Biological Chemistry*, 283(5), 2949-2961
- 12. Hao N., **Yildirim N.**, Parnell S., Errede B., Elston T.C. and Dohlman H.G.(2007), Modeling signal specificity by feedback inhibition, *FASEB Journal*, 21(5), A264-A264
- 13. Yildirim N.(2006), Use of symbolic and numeric computation techniques in analysis of biochemical reaction networks, *International Journal of Quantum Chemistry*, 106, 256-265
- 14. Bayram M. and Yildirim N.(2005), Metabolic control analysis of trio enzymes system, *Applied Mathematics and Computation*, 170(2), 948-957
- 15. Yildirim N., Santillan M., Horike D. and Mackey M.C. (2004), Dynamics and bistability in a reduced model of the lac operon, *Chaos: An International Journal of Nonlinear Sciences*, 14(2), 279-292
- Mackey M.C., Santillan M. and Yildirim N.(2004), Modeling operon dynamics: The tryptophan and lactose operons as paradigms, *Comptes Rendus Biologies*, 327(3), 211-224
- 17. Subasi M., Yildirim N. and Yildiz B.(2004), An improvement on Fibonacci search method in optimization theory, *Applied Mathematics and Computation*, 147(3), 893-901
- 18. Yildirim N., Hao N., Dohlman H.G. and Elston T.C.(2004), Mathematical Modeling of RGS and G-protein regulation in yeast, *Methods in Enzymology*, 389, 383-398
- 19. Hao N., **Yildirim N.**, Wang Y.Q., Elston T.C. and Dohlman H.G.(2003), Regulators of G-protein signaling and transient activation of signaling: Experimental and computation analysis reveals negative and positive feedback controls on G protein activity, *Journal of Biological Chemistry*, 278(47), 46506-46515

- 20. **Yildirim N.** and Mackey M.C.(2003), Feedback regulation in the lactose operon: A mathematical modeling study and comparison with experimental data, *Biophysical Journal*, 84(5), 2841-2851
- 21. Yildirim N., Akcay F., Okur H. and Yildirim D.(2003), Parameter estimation of nonlinear models in biochemistry: A comparative study on optimization methods, *Applied Mathematics and Computation*, 140(1), 29-36
- 22. Yildirim N., Ankaralioglu N., Yildirim D. and Akcay F.(2003), Application of Grobner basis theory to derive rate equations for enzyme catalyzed reactions with two or more substrates or products, *Applied Mathematics and Computation*, 137(1), 67-76
- 23. **Yildirim N.**(2002), Quasi-steady state kinetics of simple sequential multi-enzyme reactions with single substrates, *Journal of Mathematical Chemistry*, 32(3), 271-280
- 24. Yildirim N., Ciftci M. and Kufrevioglu OI.(2002), Kinetic analyses of multi-enzyme systems: A case study o f creatine kinase- hexokinase and glucose 6-phosphate de-hydrogenase, *Journal of Mathematical Chemistry*, 31(1), 121-130
- 25. Bayram M., Simsek H. and **Yildirim N.**(2002), Automatic calculation of Alexander polynomials of (3,k)-torus knots, *Applied Mathematics and Computation*, 136(2-3), 505-510
- 26. Yildirim N. and Bayram M.(2000), Derivation of conservation relationships for metabolic networks using Maple, *Applied Mathematics and Computation*, 112(2-3), 255-263
- 27. Yildirim N. and Bayram M.(2000), Analysis of the kinetics of unstable enzymatic systems using Maple, *Applied Mathematics and Computation*, 112(1), 41-48

BOOK CHAPTERS

- 1. Robeva R. and **Yildirim N.**(2013), Bistability in the lactose operon of Escherichia coli: A Comparison of differential equation and boolean network models, *Mathematical Concepts and Methods in Modern Biology Using Modern Discrete Models*, 37-74, Academic Press
- 2. Haugh J., Elston T.C., Cirit M., Wang C., Hao N. and Yildirim N.(2009), Data-driven mechanistic modeling of biochemical reaction networks, *Systems Analysis of Biological Networks*, 57-74, Artech House, Boston
- 3. Ozogur S., Sagdıcoglu Celep A.G., Karasozen B., **Yildirim N.** and Weber G.W.(2005), Dynamical modeling of enzymatic reactions, simulation and parameter estimation with genetic algorithms, *HIBIT-proceedings of international symposium on health informatics and bioinformatics*, November 10-12, 78–84, Antalya, Turkey
- 4. **Yildirim N.** and Bayram M.(2000), Symbolic and numeric computations in kinetic analysis of multi enzyme systems in biochemistry, *Problems in Modern Applied Mathematics*, 157-162, World Scientific and Engineering Society Press

LECTURE NOTES

1. Yildirim N., Lecture Notes on Differential Equations (201 pages, Unpublished)

- 2. Yildirim N., Lecture Notes on Mathematical Modeling (241 pages, Unpublished)
- 3. Yildirim N., Lecture Notes on Probability (151 pages, Unpublished)
- 4. Yildirim N., Lecture Notes on Mathematical Statistics (256 pages, Unpublished)
- 5. Yildirim N., Lecture Notes on Numerical Methods (298 pages, Unpublished)
- 6. Yildirim N., Matlab Programming Manual (89 pages, Unpublished)
- 7. Yildirim N., Lecture Notes on Systems Biology (72 pages, Unpublished)

INVITED TALKS AND ORAL PRESENTATIONS

- 1. **Yildirim N.**(2016), Systems biology, cell signaling and design patterns in gene regulation, *Workshop on Grand Challenges in Engineering and Applied Sciences*, May 28-30, 2016, Florida International University, Miami FL
- 2. Yildirim N.(2013), Mathematical modeling of biochemical reaction networks and the lactose operon, *The EDGE program: Enhancing Diversity in Graduate Education*, June 12th, New College of Florida, Sarasota FL
- 3. **Yildirim N.**(2010), Feedback regulation and control of signaling in yeast mating response pathway, *International Symposium on Biomathematics and Ecology Education and Research*, September 4-5, Illinois State University, Normal IL
- 4. **Yildirim N.**(2009), Modeling and simulation of biochemical reaction networks: The lactose operon example in E.coli, *International Symposium on Biomathematics and Ecology Education and Research*, June 3-17, Izmir University of Economics, Izmir, Turkey
- 5. Henderson C.⁺ and **Yildirim N.**(2009), Computer algebra approach to sensitivity analysis in biochemical network analysis, *15th International Conference on Applications of Computer Algebra*, June 25-28, Montreal, Quebec, Canada ⁺Undergraduate student mentored by Necmettin Yildirim
- 6. **Yildirim N.**(2004), Some uses of computer algebra in enzyme kinetics, *228th American Chemical Society National Meeting*, August 22-26, Philadelphia, PA
- 7. **Yildirim N.**(2006), What's math got to do with it? How computational approaches help understand cell signaling, February 9th, *New College of Florida*, Sarasota, FL
- 8. **Yildirim N.**(2005), Regulation of G-protein and MAPK activity revealed by mathematical modeling and experimental analysis: Controlling signal intensity and specificity, April 17th, *Virginia Commonwealth University*, Richmond, VA
- 9. Yildirim N., Yetiskin H. and Bayram M.(2001), Automatic derivation of conservation relationships for metabolic pathways: A Maple Program, *Mathematical Modeling and Scientific Computing: An International Conference*, April 2-6, Ankara-Konya, Turkey
- 10. **Yildirim N.**, Bayram M., Ciftci M. and Kufrevioglu OI.(2000), Sembolik ve numeric metotlarla cok enzimli bagli sistemlerin kinetiklerinin incelenmesi, *Ulusal Kimya Kongresi*, 10-15 Eylül, Dicle Universitesi, Diyarbakir, Turkey
- 11. Yildirim N. and Bayram M.(2000), Symbolic and numeric computations in kinetic analysis of multi enzyme systems in biochemistry, *2nd World Conference on Mathematics and Computers in Physics*, July 10-15, Vouliagmeni, Greece

POSTER PRESENTATIONS

- Dyjack N.⁺ and Yildirim N.(2016), Differential regulation of G-protein signaling by the phosphatases in yeast: Mathematical modeling and comparison with experimental data, USF STEM Summit, March 30th, University of South Florida, FL ⁺Undergraduate student mentored by Necmettin Yildirim
- Statz JK.⁺ and Yildirim N.(2009), Analysis of stimulus responses in biochemical chain reactions involving feedback and feedforward loops, *International Conference* on Mathematical Biology and Annual Meeting of the Society for Mathematical Biology, July 27-30, University of British Colombia, Vancouver, Canada ⁺Undergraduate student mentored by Necmettin Yildirim
- 3. Salisbury A.⁺ and **Yildirim N.**(2009), Cellular automata model of a predator-prey system, *International Symposium on Biomathematics and Ecology Education and Research*, June 3-17, Izmir University of Economics, Izmir, Turkey ⁺Undergraduate student by Necmettin Yildirim
- 4. **Yildirim N.**, Hao N., Dohlman H.G. and Elston T.C.(2004), Mathematical modeling of G-protein signaling pathway in yeast, *Gordon Research Conference*, June 4-11, Tilton School, NH
- 5. Yildirim N., Horike D. and Mackey M.C.(2002), Regulation of lactose operon: A mathematical modeling study, *MITACS Third Annual General Meeting*, May 23-25, University of British Columbia, Vancouver, Canada.
- 6. **Yildirim N.** and Mackey M.C.(2002), Dynamics and bistability in the lactose operon: A mathematical modeling and comparison with experimental data, *First SIAM Conference on Life Sciences*, April 11-13, Boston, MA
- 7. **Yildirim N.**(2001), Application of Grobner bases theory to derive steady state rate equations in biochemical kinetic theory, *Maple application center* (Online at www.maplesoft.com/applications/view.aspx?SID=3445&view=html)

MEETINGS, CONFERENCES AND WORKSHOPS

- 1. The Leon Glass and Michael C. Mackey Diamond Symposium, June 14-15, 2018, McGill University, Montreal, Canada
- 2. The Society of Mathematical Biology Annual Meeting, June 30-July 3, 2015, Georgia State University, Atlanta GA
- 3. Yildiz Bioengineering Days, May 16-17, 2011, Yildiz Teknik University, Istanbul, Turkey
- 4. 7th International Conference on Differential Equations and Dynamical Systems, December 15-18, 2010, University of South Florida, Tampa FL
- 5. American Mathematical Society Joint Mathematics Meetings, January 13-16, 2010, San Francisco CA
- 6. American Mathematical Society Joint Mathematics Meetings, January 5-8, 2009, Washington DC

- 7. American Mathematical Society Sectional Meetings, October 30 November 1, 2009, Florida Atlantic University, Boca Raton, FL
- 8. MSRI Modern Mathematics Workshop, October 25-26, 2006, University of South Florida, Tampa FL

GRANT PROPOSALS

- Proposal title: Ultrasensitivity and Noise processing in cellular signaling, Amount: \$5082, New College Faculty Development Funds, 2019
- 2. Proposal title: Ultrasensitivity and Noise processing in cellular signaling and lecture note preparation, Amount: \$6000, New College Faculty Development Funds, 2018
- 3. Proposal title: Cellular signal adaptation and robustness of ultrasensitive responses in cell signaling, Amount: \$3000, New College Faculty Development Funds, 2017
- 4. Proposal title: Modeling G-protein dynamics and adaptation, Amount: \$3000, New College Faculty Development Funds, 2016
- 5. Proposal title: Dynamic responses of alternatively designed regulatory gene circuits to external stimuli , Amount \$5000, New College Faculty Development Funds, 2015
- 6. Proposal title: Comparative study on dynamic responses of different genetic regulatory mechanisms, Amount \$4484, New College Faculty Development Funds, 2014
- 7. Proposal title: Comparative study on dynamic responses of different gene regulatory mechanisms to external Signals, Amount \$2775, New College Faculty Development Funds, 2013
- 8. Proposal title: Bistability in the lac operon models: Differential equation and boolean network approximation approaches, Amount \$3980, New College Faculty Development Funds, 2012
- 9. Proposal title: Mathematical modeling of arabinose transport mechanisms in E.coli, Amount \$3375, New College Faculty Development Funds, 2011
- 10. Proposal title: Deterministic and stochastic simulation and analysis of biochemical regulatory reaction, Amount \$3000, New College Faculty Development Funds, 2010
- 11. Proposal title: Mathematical modeling of arabinose utilization in E. coli II, Amount \$3000, New College Faculty Development Funds, 2009
- 12. Proposal title: Teaching mathematics with active response system at New College of Florida submitted to National Collegiate Honors Council under Portz Fund Grant Program (not funded), 2009
- 13. Proposal title: Creating an undergraduate biomathematics program and a multiinstitutional biomathematics research consortium centered at Illinois State University that is submitted to National Science Foundation under the program course, Curriculum, Laboratory Improvement (not funded), 2009
- Proposal title: Mathematical modeling of arabinose utilization in E. coli I, Amount \$4000, New College Faculty Development Funds, 2008

- 15. Proposal title: Sensitivity analysis of a mathematical model for the mating response pathway of yeast, Amount \$4000, New College Faculty Development Funds, 2007
- 16. Research grant of \$9800 from The Scientific and Technical Research Council of Turkey under the North Atlantic Treaty Organization (NATO) grant program

AWARDS AND HONORS

- 1. Research award of \$1000 from The Scientific and Technical Research Council of Turkey, 2000
- 2. Student-Employee Fellowship from The Scientific and Technical Research Council of Turkey from 1988 to 1989
- 3. Honors degree during undergraduate study

COMMITTEE SERVICES AT NEW COLLEGE OF FLORIDA

1.	International Studies Committee	Spring 2019
2.	Division Budget Committee	2018-2019
3.	Provost Academic Advisory Committee	2017-2019
4.	International Studies Committee	2015-2016
5.	UFF Bargaining Team	2014-Present
6.	Division Budget Committee	2014-2016
7.	Student Research and Travel Grant Committee	2014-2015
8.	Daughters of Life Committee	2013-2014
9.	Student Academic Status Committee	2013-2014
10.	Student Academic Status Committee	2012-2013
11.	Scholarship Committee	2011-2012
12.	Student Academic Status Committee	Fall 2010
13.	Student Research and Travel Grant Committee	Fall 2010
14.	Division Budget Committee	2009-2010
15.	Student Research and Travel Grant Committee	2007-2008
16.	Division Budget Committee	2008-2009

EDITORIAL BOARD

1.	Frontiers in Systems Biology	2010-Present
2.	Discrete Dynamics in Nature and Society	2014-Present
3.	Molecular BioSystems	2015-Present

REFEREED PAPERS FOR THE FOLLOWING JOURNALS

- 1. In Silico Biology
- 2. Bulletin of Mathematical Biology
- 3. Biochemical Engineering Journal
- 4. Discrete Dynamics in Nature and Society
- 5. Journal of Theoretical Biology
- 6. Journal of the Royal Society Interface
- 7. Journal of Biological Physics
- 8. Numerical Methods for Partial Differential Equations
- 9. Yeast
- 10. European Journal of Biochemistry
- 11. Proceedings of the 44th IEEE Conference on Decision and Control
- 12. Frontiers in Systems Biology

CONFERENCE ORGANIZATION

1. Session Organizer at International Symposium on Biomathematics and Ecology Education and Research, September 4-5, 2010, Illinois State University, Normal IL

PROFESSIONAL ASSOCIATION MEMBERSHIP

- 1. Society for Industrial and Applied Mathematics (SIAM)
- 2. American Mathematical Society (AMS)
- 3. Society for Mathematical Biology (SMB)
- 4. Turkish American Scientists and Scholars Association (TASSA)
- 5. United Faculty of Florida (UFF)

APPENDIX F — Members of the Advisory Board

Michael P. Crosby, Ph.D.

President & CEO Mote Marine Laboratory and Aquarium

Dr. Crosby has more than 30 years of diverse research, teaching, science management and leadership endeavors. He has gained experience and expertise in developing, managing and conducting multi-disciplinary research and overseeing programs through his interactions, involvement and partnerships with numerous universities, national and international science and resource management agencies, programs and committees. Many of these endeavors focused on improving the synthesis, translation and transfer of science and technical information between research, public policy and stakeholder communities. He has played an active and significant role in directly leading national and international multi-disciplinary research programs, as well as developing national policy and administrative aspects for our country's science programs.

In May 2013, Dr. Crosby was appointed as President & CEO of Mote Marine Laboratory and Aguarium, an independent research institution that has been a leader in marine research for 60 years. Dr. Crosby had previously served for three years as Mote's Senior Vice President for Research. He came to that position following appointments as Associate Vice President for Research and Economic Development at George Mason University, and Vice Chancellor for Research at the University of Hawai'i - Hilo. Prior to those appointments, he served in a federal Senior Executive Service position as Executive Director of the National Science Board - National Science Foundation. He came to the Board from the National Oceanic and Atmospheric Administration (NOAA) where he served as Senior Advisor for International Science Policy in the Under Secretary's Office of International Affairs at NOAA. His previous positions in NOAA have been: Executive Director for the NOAA Science Advisory Board; National Research Coordinator for Ocean and Coastal Resource Management; and Chief Scientist for Sanctuaries and Reserves. Dr. Crosby also completed a special detail from NOAA to the U.S. Agency for International Development, where he served for two years as the Senior Science Advisor for Marine and Coastal Ecosystems. Prior to joining NOAA, he held numerous faculty positions with the Baruch Institute for Marine Biology and Coastal Research at the University of South Carolina, the Department of Marine Science at Coastal Carolina University, the Graduate Program at the University of Charleston, Salisbury State University and is currently Adjunct Professor of Marine Science at UH Hilo. He has also had previous science positions with the National Marine Fisheries Service, U.S. Army Corps of Engineers, and National Cancer Institute-NIH.

He obtained an M.S. in Biology, with honors, from Old Dominion University and a Ph.D. in Marine-Estuarine-Environmental Sciences at the University of Maryland. He has developed successful research grants of more than \$50 million from NSF, NOAA, EPA, DOD, USAID, and others. Dr. Crosby has led major national and international, multi-discipline, multi-year research projects, such as a U.S. Man and the Biosphere Program project entitled "Ecological and socio-economic impacts of alternative access management strategies in marine and coastal protected areas"; the U.S., Israeli and Jordanian joint partnership project entitled "The Red Sea Marine Peace Park Cooperative Research, Monitoring and Management Program"; and the Hawai'i State EPSCoR project entitled "Pacific High Island Evolutionary Biogeography: Impacts of Invasive Species, Anthropogenic Activity and Climate Change on Hawaiian Focal Species." He is a member of the Natural Areas Association, Coastal Society, National Shellfisheries Association, Estuarine Research Federation, American Association for the Advancement of Science and is a Fellow of the Linnean Society of London. He also served 12 years on the Board of Governors and was past Chairman for the U.S.-Israeli Binational Science Foundation, is a Past-President for Sigma Xi-The Scientific Research Society, and is currently on the Board of Directors (Past-President) for the Association of Marine Laboratories of the Caribbean, Board of Directors (Past-President) for the Pacific Congress on Marine Science and Technology, and the Institute for Venture Science Board of Advisors.

Dr. Crosby serves as a reviewer and panelist for numerous scientific journals and national and international science panels and advisory committees. He has published more than 50 articles in the Marine Ecology Progress Series, Journal of Shellfish Research, Journal of Experimental Marine Biology and Ecology, Diseases of Aquatic Organisms, Marine Biology, Marine Pollution Bulletin, Limnology and Oceanography, Ocean and Coastal Management, Natural Areas Journal, Coral Reefs, Oceanography, Aquatic Conservation, various technical memoranda series, and has edited several books and manuals dealing with marine protected areas and coral reefs. In 2009, he also co-Chaired the development of a Hawai'i Statewide Science and Technology Strategic Plan as requested by the Hawai'i State Legislature.

Michael Hawrylycz, Ph.D.

Investigator Director, Data science and Informatics Allen Institute for Brain Science

Mike Hawrylycz is one of the founding scientists at the Allen Institute and involved in most aspects of quantitative data analysis, product development, and public presentation of the Institute's work. He is actively involved in quantitative neuroscience and most recently in the design and implementation of the Institute's cell type efforts. His main educational background is in discrete applied mathematics including computational algorithms and combinatorics. Presently he is Investigator and Director of the Data Science and Informatics at the Allen Institute for Brain Science, having joined the Institute in December 2003. His work over the years has been in the development of infrastructure and analysis of large-scale data in neuroscience applications, particularly for digital atlases of gene expression in the brain and including developing biophysically realistic and simplified models of neurons and their circuits, the analysis and interpretation of transcriptomic, electrophysiology, and morphology data, and computational neuroanatomy. Prior to joining the Allen Institute, he developed many of the original algorithms used in epigenetics while at the University of Washington, where he is Affiliate Professor in Genome Sciences.

Ellen Belitzky, Ph.D.

Business Intelligence Stream Leader Danone North America

Ellen Belitzky, Ph.D. has more than 30 years of professional experience in information systems, technology, and analytics services. Professional roles have included all facets of the IT function from senior technical and architecture positions to project, program, portfolio, process, and quality management roles. Dr. Belitzky has worked extensively in the consumer-packaged goods industry (Danone, Unilever, Playtex Products). She has also worked in banking, government, insurance, health care, and not-for-profit organizations.

Ellen Belitzky holds a Ph.D. in Technology Management from the School of Engineering at the University of Bridgeport. She began her academic career earning a B.S. in Economics from the Wharton School of the University of Pennsylvania where she concentrated in decision sciences and marketing. At the University of Pennsylvania, she also earned a M.S. in Education focused on educational management and organizational psychology with emphasis on how adults learn new technology. Ellen Belitzky was awarded an MBA from the University of Connecticut in marketing and management. She maintains certifications from the Project Management Institute (PMP) and American Society for Quality (CMQ/OE). Research interests include technology management, knowledge management, healthcare systems, social media, project management, and process improvement. Ellen Belitzky is an active community volunteer and resides in Fairfield, CT.

Mulugeta Haile, Ph.D.

Research Team Leader U.S. Army Research Laboratory (ARL)

Dr. Mulugeta Haile is a senior aerospace engineer and research team leader at the Vehicle Technology Directorate (VTD) of the U.S. Army Research Laboratory (ARL), Aberdeen Proving Ground, Maryland. He received his graduate degrees in Electrical and Aerospace Engineering at the University of Florida, Gainesville. Dr. Haile is a lead on several research projects in aerospace sciences and artificial intelligence. He was a technical lead at the Joint Artificial Intelligence Center (JAIC) National Mission Initiative on AI-enhanced flight regime modeling and predictive maintenance. He is the founder of the intelligent mechanics (iMechanics) lab at ARL-VTD. He has authored over 70 papers in top journals, conference proceedings, and book chapters and has over 19 years of research and development experience.

Destin Wells

VP of Business Development Services Economic Development Corporation of Sarasota County

Destin Wells is the Vice President of Business Development Services at the Economic Development Corporation of Sarasota County. He comes to the EDC by way of Enterprise Florida, where he was the Director of Aerospace and Defense for the State, working projects that generated more than 10,000 jobs and \$1.3 billion in Capital Investment.

Committed to Economic Development and the impact on the individual and their ability to provide for their family, Destin brings a balance of the relational and data-driven approaches to building strategy and affecting outcomes. Prior to his time in Economic Development, Destin was a consultant for small businesses, focusing on Export Marketing for the Small Business Development Center.

Destin graduated from the University of Central Florida with B.A. in Political Science and Master's in Business Administration. In his personal time, he enjoys spending time with his wife, Haley, and two children, Addison and Landon. You can often find him with a guitar in his hands and close to the water.

Vicki P. Raeburn

Co-Founder and Chief Financial/Strategy Officer Panartis Corp

Vicki is a business executive with extensive experience in strategy, data operations, product development, and general management for financial information companies including Standard & Poor's, Reuters, Dun & Bradstreet, and IHS Markit. She has also taken leadership positions in start-up companies and consulted with Big Data companies. She has a B.A. from New College and a Ph.D. from Yale University.

Norman Worthington

CEO & Executive Chairman Star2Star Communications

Norman Worthington is a serial entrepreneur/investor and founder or cofounder of nine software and software enabled services companies.

One of Mr. Worthington's earliest ventures was The Software Toolworks. Started in 1987, it became one of the first highly successful consumer software companies. Several of the original Software Toolworks

titles, such as Mavis Beacon Teaches Typing! and the Chessmaster series, are among the all-time best selling products in their categories. These titles are still available today, and each has sold tens of millions of copies. Software Toolworks became a public company in the early 90's and was subsequently purchased and taken private. It was acquired by Mattel in 1999.

In 1993 Mr. Worthington entered a joint venture with Computer Associates. The joint venture developed and successfully launched the world's first Enterprise Application Integration system. This product, called Opal, integrated the back office systems of Fortune 1000 companies and made the information accessible over the Internet. It was used by Wal-Mart, among many others, as the backbone of their hugely successful supply-chain extension strategy in the late nineties. Opal was the featured product of Computer Associates' 1995 annual report and, in 1996, Computer Associates purchased Mr. Worthington's interest in the joint venture.

In 2006, Worthington founded and assumed the role of CEO and Executive Chairman of Star2Star Communications in Sarasota, Florida. A global leader in cloud-native communications, collaboration, and integration solutions for the enterprise, Star2Star unifies customers' voice, video, fax, instant messaging and presence management into a single, easy-to-use system. Star2Star's award-winning, patent-pending Constellation[™] technology overcomes the reliability and quality limitations of other Internet communications technologies.

Star2Star has been named to the Inc. 500|5000 list of fastest growing companies seven times, the Forbes Most Promising Companies list, the Deloitte Technology Fast 500 two times and just recently won Inc Magazine's Hire Power Award which recognizes the top private business job creators in the country. Worthington was personally recognized as an Ernst & Young Entrepreneur of the Year in 2018.

Norman received his Bachelor of Arts from New College of Florida and a law degree from Northwestern School of Law, Lewis & Clark College. Since 1997, he has acted as investor, advisor and board member for many technology-based startup companies and philanthropic organizations.

Beth Porter

Co-founder and CEO Riff Analytics

Beth Porter is the CEO and co-founder of Riff Analytics, which develops automated coaching and training tools to help people learn how they communicate with others. Formerly, Beth was the VP of technical platform at Pearson Education and VP of product engineering at edX. Beth has led research and development of products that seek to transform online teaching and learning, including driving the Open edX initiative at edX and architecting the original Texas OnCourse program. Her engagements in higher education include lecturer and researcher at Boston University Questrom School of Business and MIT Media Lab.

Dan Camper

Senior Architect LexisNexis Risk Solutions Group

Dan has been with LexisNexis Risk Solutions Group since 2014 and is a Senior Architect in the HPCC Solutions Lab. He has worked for Apple and Dun & Bradstreet, and he ran his own custom programming shop for a decade. He's been writing software professionally for over 40 years and has worked on a myriad of systems, using many different programming languages.

Tom Grant

Principal Analytical Training Consultant SAS

Tom Grant holds a Master of Science in Operations Research from Virginia Commonwealth University. Prior to joining SAS in 2000, Tom worked in the accounting department of national furniture retailer and developed statistical models to predict inventory losses. Tom was also manager of the Marketing Analytics Group for a retail clothing catalog company, in charge of building predictive response and life-time value models. Since joining SAS, Tom has worked as a consultant, assisting SAS customers with implementation of analytic projects in various industries, including banking, retail services, insurance, manufacturing, and web-site analysis. Tom also teaches Introduction to Statistics at a small liberal arts college. Tom is currently a Principal Analytical Training Consultant in the SAS Global Academic Program, and he assists higher education institutions in the effective use of SAS.

Roxie Jerde

President & CEO Community Foundation of Sarasota County

Roxie Jerde has served as President and CEO of the Community Foundation of Sarasota County since March of 2011.

Since arriving in Sarasota, Roxie has worked closely with Community Foundation donors, along with area nonprofits, businesses and foundations, to solve important issues affecting our community. She spearheaded the launch of DonorEdge – locally branded as The Giving Partner in partnership with local foundations, and six successful Giving Challenges that have raised more than \$40 million for our local nonprofits, strengthened by support from The Patterson Foundation. She has been a leader in numerous community collaborations including Season of Sharing, a community initiative for those on the verge of homelessness; the Campaign for Grade Level Reading; Any Given Child, which works to expand arts education, ensuring access and equity for all students; and EdExploreSRQ, an initiative that provides students with valuable exposure to arts, science and culture through educational "explorations." She also spearheads the Two Generational initiative which focuses on creating opportunities for and addressing needs of both vulnerable children and their parents together, informed by a partnership with Ascend of the Aspen Institute.

Roxie was selected to participate in the 2012 Florida Executive Leadership program. She is also a past Chair and current member of the Community Foundations of Florida, a past Trustee of the Southeastern Council on Foundations, and past board and current member and of the Suncoast International Women's Forum. She was honored as a 2014 "Woman in Power" by the National Council of Jewish Women – Sarasota/Manatee and as a 2015 "Women of Light Award" from the Women's International Conference of Westcoast Center for Human Development. In 2018 she was named an Outstanding Leader by the Girl Scouts of Gulfcoast Florida and received the Distinguished Service Award from the Sarasota County Bar Association.

Roxie is from Kansas City where she served as Senior Vice President for Donor Relations and Education at the Greater Kansas City Community Foundation, one of the largest community foundations in the nation and widely regarded as a thought leader in philanthropy. Previously, she held a number of senior marketing and product-development positions at for-profit companies, including an 11-year career at Hallmark Cards.

Roxie has a BBA in Marketing and Management from the University of Iowa and a MBA in Finance and Organizational Behavior from the University of Missouri – Kansas City.

An avid bicyclist with her husband, Mike, Roxie enjoys exploring Sarasota's beautiful roads and trails. Roxie also enjoys spending time with family and friends, traveling, cheering on the Iowa Hawkeyes, yoga and reading.

Joe Bungo Deep Learning Institute Progr

Deep Learning Institute Program Manager NVIDIA Corporation

Joe Bungo is the Deep Learning Institute (DLI) Program Manager at NVIDIA where he enables the use of deep learning and GPU accelerated computing technologies in universities, including curriculum and teaching material development, DLI University Ambassador/Instructor Certification, facilitation of academic ecosystems, and hands-on workshops. Previously, he managed university programs at ARM Inc. and worked as an applications engineer. Joe received his degree in Computer Science from the University of Texas at Austin.

David Shrier

Managing Director Visionary Future, LLC.

David Shrier is a Professor of Practice (AI & Innovation) with Imperial College Business School, Imperial College London, and holds a secondary appointment with Said Business School, University of Oxford. He is a globally recognized authority on technology innovation, serial entrepreneur and corporate innovator, and author.

David's government portfolio includes advising regulators and policymakers in the US, EU, and UK. He has led projects including the Commonwealth Fintech Toolkit, a framework document to support government officials in 53 countries serving 2.4 billion people.

David specializes in helping established organizations to act strategically to build new revenue and new markets. He has generated \$9 billion of growth opportunities with C-suite executives, particularly in data-driven businesses related to the financial services sector. He has led a number of private equity and venture capital-backed companies as CEO, CFO or COO, in either interim or full-time capacities, and has cofounded four AI-enabled MIT spinouts including Esme Learning Solutions (www.EsmeLearning.com). He is also the CEO of Adit EdTech Acquisition Corp. (NYSE: ADEX.U, www.AditEdTech.com).

David's books on AI, distributed ledger and identity include Trusted Data (with Alex Pentland and Thomas Hardjono, MIT Press, 2019), Basic Blockchain (Little Brown, 2020) and the forthcoming Augmenting Your Career (Little Brown, 2021). He holds an Sc.B. from Brown University in Biology and Theater, Speech & Dance.

Kevin Hunt

Team Lead Data Scientist Novetta, Inc.

Kevin is a graduate of New College of Florida (2018) and now leads a team of data scientists at Novetta. She has a Bachelor of Biology from Purdue University, Master of Biology from Purdue University, Master of Biochemistry and Molecular Biophysics from University of Chicago, and Master of Data Science from New College of Florida. She has 5 scientific publications, one of which is on Machine Learning for 3D Printing resulting from her summer internship with NASA. As a team lead of data scientists at Novetta, Kevin guides her team to deliver applied data science solutions for real problems to real customers while maintaining awareness of cutting-edge DS/ML capabilities.

APPENDIX G — Letters of Support

- Allen Institute for Brain Science
- U.S. Army Research Laboratory
- Community Foundation of Sarasota County
- Danone North America
- Dealers United
- FCCI Insurance Group
- LexisNexis
- Mote Marine Laboratory & Aquarium
- U.S. Department of Commerce
- Novetta
- NVIDIA
- Riff Analytics
- Economic Development Corporation of Sarasota County
- SAS
- Star2Star Communications
- Visionary Future

615 Westlake Avenue N Seattle, Washington 98109 206.548.7000 phone



January 10, 2021

Dr. Donal O'Shea, President New College of Florida 5800 Bay Shore Road Sarasota, FL 34243

Dear President O'Shea,

I am pleased to write in support of the development of a new M.S. degree program in *Applied Data Science* at New College of Florida, the State's honors college.

I have for several years followed the development of your strong educational initiatives in data science, through discussion and planning with key faculty and in two separate teaching visits, most recently in January 2020. The hiring of Prof. Burcin Bozkaya will be key to the success of these new initiatives and he is well positioned to take forward your initial vision and the work of Prof. Patrick McDonald. I have had the most positive interactions with these and other faculty.

As one of pioneers of big data in the neurosciences, we at the *Allen Institute for Brain Science* understand the need for strong national programs to train talented students in how to interpret, process, and analyze large data sets. The training of talented master's and undergraduate students at NCF, an exemplary institution, will help fill critical needs in these fields. We are established and well connected in the neurosciences and are more than willing to help position your students for success.

In addition to teaching and interacting with NCF faculty, the *Allen Institute for Brain Science* has hosted several talented interns during our yearly summer program and I will look forward to continuing this interaction as our ability to interact resets. Further, the product of the outstanding training and preparation that the NCF Master's program would offer will produce the type of strong candidates that we are attracted to.

I wish you much success with getting your new M.S. program off to a great start.

Michael Hayfr

Mike Hawrylycz, Ph.D. Investigator Director, Informatics and Data Science Allen Institute for Brain Science

alleninstitute.org brain-map.org



DEPARTMENT OF THE ARMY U.S. ARMY COMBAT CAPABILITIES DEVELOPMENT COMMAND ARMY RESEARCH LABORATORY VEHICLE TECHNOLOGY DIRECTORATE 6340 RODMAN ROAD ABERDEEN PROVING GROUND, MARYLAND 21005

January 13, 2021

Dr. Donal O'Shea, President New College of Florida 5800 Bay Shore Road Sarasota, FL 34243

Dear President O'Shea-

I am writing in support of the development of a new Master's degree program in Applied Data Science at New College of Florida, the State's honors college.

As you know, data analytics is becoming mission-critical to enterprises across all disciplines including the U.S. Army Research Laboratory (ARL). One of the primary challenges we face is the shortage of well-trained data scientists. Currently, there is a huge unmet demand for data scientists in federal research labs and the prediction is that the demand will grow exceptionally through the foreseeable future. A targeted Master's program in Applied Data Science aimed at producing well-qualified candidates will certainly help.

In the fall of 2020, I had the privilege to support a data science project led by Dr. Burcin Bozkaya, which turned out to be very productive. Going forward, and as part of the ARL's outreach program, I plan to continue our collaboration through joint cooperative projects, summer internships, and placements.

I wish you success with getting your new Master's program up and running and offer this letter in support of the prospective program.

Sincerely,

HAILE.MULUGET ^{Digitally signed by} A.A.1395540994 Date: 2021.01.13 14:19:16 -05'00 Dr. Mulugeta Haile Aerospace Research, Lead Vehicle Technology Directorate U.S. Army Research Laboratory Aberdeen Proving Ground, Maryland Office: 410.278.5289 Mobile: 240.478.8737





January 12, 2021

Dr. Donal O'Shea, President New College of Florida 5800 Bay Shore Road Sarasota, FL 34243

Dear Dr. O'Shea:

I am writing to strongly endorse the new MS in Applied Data Science which New College plans to launch in Fall 2021.

The Community Foundation of Sarasota County, a long-time supporter of New College, is currently providing an initial internship to a data analytics student at New College, Ashley Brockway. She is an outstanding student, and we are honored to provide her an internship learning opportunity.

Her internship will provide her experience in data analytics such as:

- Identifying community challenges, inequities, and solutions
- Understanding trends in the nonprofit sector and opportunities to strengthen nonprofits
- Utilizing predicative analytics to analyze giving data for community wide initiatives such as Season of Sharing and the Giving Challenge

Providing opportunities for New College masters students to understand our community through data analysis and apply the learning to solutions is a powerful example of integrating New College students into community building and strengthening. This will ultimately lead to hopefully giving them a lifelong commitment to community.

Congratulations on launching the new MS in Applied Data Science. The Community Foundation of Sarasota County looks forward to a continuing partnership in the internship program.

Sincerely,

Home & ferle Roxanne G. Jerde

President/CEO

CC: Burcin Bozkaya

2635 Fruitville Road • Sarasota, FL 34237 Phone 941.955.3000 • Fax 941.952.1951 www.CFSarasota.org



Confirmed in compliance with National Standards for U.S. Community Foundations



Ellen Belitzky Business Intelligence Stream Leader Danone North America 1 Maple Avenue White Plains, NY 10605

M: 914 491 9516 Ellen.Belitzky@danone.com

danonenorthamerica.com

20 January 2021

Dr. Donal O'Shea, President New College of Florida 5800 Bay Shore Road Sarasota, FL 34243

Dear President O'Shea:

I am writing to support the new graduate program at New College of Florida announced as MS in Applied Data Science.

The proposed courses and practical experiences uniquely prepare students to become not only valuable contributors, but also leaders in the organizations to which they will join upon graduation. The applied nature of the program pays homage to the economic reality of a post-pandemic environment where data is leveraged to understand a situation, assess strategic and tactical options, track implementation progress, and evaluate the success of initiatives.

While my relationship with NCF is recent, I have researched many competing education programs and discussed plans with Dr. Burcin Bozkaya who will be directing the new program. I am inspired by his ambition and eager to engage with NCF to create productive opportunities for students in the future.

I look forward to a journey partnering with New College of Florida to educate a new generation of applied data scientists who have the well-rounded skillset required for delivering value in the workplace.

Sincerely,

Ellen Belityhy

Ellen Belitzky, Ph.D.

Danone North America Broomfield, Colorado Office 12002 Airport Way Broomfield, CO 80021 (303) 635-4000 White Plains, New York Office 1 Maple Avenue White Plains, NY 10605 (914) 872-8400



Dealers United 1680 Fruitville Road Ste 401 Sarasota, FL 34236

(941) 366-6760

December 28, 2020

Dr. Donal O'Shea, President New College of Florida 5800 Bay Shore Road Sarasota, FL 34243

Dear President O'Shea:

I am pleased to write in support of the development of the MS in Applied Data Science at New College of Florida.

Dealers United has recently participated in the Fall 2020 semester in partnership with Burcin Bozkaya. We found the program to be very successful for the students and Dealers United.

As one of the largest automotive advertisers partnered with Facebook & Instagram, we have a great opportunity to help automotive dealers around the world find actionable insights to help improve customer experience, lower costs, engage better customers, and potentially save them from going out of business if they don't adapt in today's data driven world.

There is an ongoing need for data science and many companies are sitting on massive amounts of unactionable data. It is clear that we need to train individuals on how to make this data understandable and actionable. Helping businesses, non-profits, and governments better understand the data we should be collecting, what answers we can uncover from the data, and what actions should be taken based on the data will help in the digital evolution.

We are in full support of New College's new Master's program in Applied Data Science, and helping ensure it is successful. We look forward to the continued partnership and hiring more New College students.

Sincerely,

Pete Petersen CEO & Managing Partner, Dealers United



January 7, 2021

Dr. Donal O'Shea, President New College of Florida 5800 Bay Shore Road Sarasota, FL 34243

Dear President O'Shea,

I am writing to you as a show of support for the new Master's Program, "MS in Applied Data Science".

I am fortunate to have been able to oversee our Predictive Analytics Unit at FCCI Insurance Group for the past 8 years. I have had a front row seat in witnessing how impactful analytics has been in our industry. What began with skepticism and push back from all corners of the organization, analytics is now at the heart of virtually every meeting of any strategic significance at our company. The insurance industry, like so many others, has been completely transformed by this skill set.

Recently, a colleague of mine and I had the opportunity to present to some of your students in a one hour webinar. It began on a Friday afternoon at around 4:30pm. I was amazed that over 20 bright and engaged college students were so eager to learn about data analytics that late on a Friday afternoon. I will confess I probably would not have been one of those in attendance given my typical Friday afternoons on campus. It was quite an impressive group.

The need for well-trained data scientists is real, and growing. Again, I want to express my wholehearted support for the "MS in Applied Data Science" at New College of Florida.

Sincerely,

Robert E. Davis, FCAS, MAAA Vice President & Actuary

6300 UNIVERSITY PARKWAY | SARASOTA, FL 34240-8424 | 800-226-3224 | FAX: 800-226-3243 | WWW.FCCI-GROUP.COM



January 6, 2021

Dr. Donal O'Shea, President New College of Florida 5800 Bay Shore Road Sarasota, FL 34243

Dear President O'Shea,

I am writing to express LexisNexis Risk Solutions Group's strong support regarding the proposed MS in Applied Data Science program at New College of Florida. LexisNexis has a history of support of NCF curriculum, including practicums on big data using our HPCC Systems[®] platform and hosting internship programs for NCF students since 2018.

We at LexisNexis believe that an effective way to address the current talent gap in technology is to help develop the talent pool throughout the academic years of these professionals. We are excited about the prospects of the new data science program, as it offers additional opportunities to research and solve problems around big data with the help of some of the freshest minds on the planet.

We look forward to the continued collaboration with NCF with the proposed program.

Sincerely,

Da & Cap

Dan S. Camper Senior Architect LexisNexis Risk Solutions Group


1600 Ken Thompson Parkway Sarasota, FL 34236 Phone: (941) 388-4441 • info@mote.org MOTE.ORG

Howard (Sam) Seider, M.D. Chairman, Board of Trustees

> Michael P. Crosby, Ph.D. President & CEO

January 14, 2021

Dr. Donal O'Shea President New College of Florida 5800 Bay Shore Road Sarasota, FL 34243

Dear Dr. O'Shea,

The purpose of this letter is to provide you with a statement of the strongest level of support from Mote Marine Laboratory (Mote) for the New College of Florida (New College) proposed Master of Science degree in Applied Data Science (MS-ADS). I also want to express Mote's continued strong support of New College's growing big data science initiatives.

Mote has been in existence for over 66 years as an independent, nonprofit marine science institution with 260 staff with 35 PhD-level scientists conducting world-class research around the world in 24 diverse research program areas such as: coral reef ecology; shark behavior and biology; ocean observing systems; harmful algal bloom dynamics; marine biomedical, microbiology and immunology; ecotoxicology and environmental health; marine mammal and sea turtle biology and population dynamics; ocean technology, engineering, sensor development and robotics; benthic ecology, aquaculture systems research and development; and numerous other areas of focus. We operate six Mote marine research and science educations campuses, including three in the Florida Keys, and remain one of the few completely independent marine research institutions of our size and impact in the world. As such we have somewhat unique abilities and flexibility to nurture innovation and potentially transformative research and technology development essential for addressing some of the most pressing grand challenges facing our oceans.

The field of applied data science is extremely valuable for uncovering valuable insights hidden in the vast amounts of data that Mote's innovative transdisciplinary research produces each year. Because Mote and New College have great potential for significant synergies in applied analytics related to incredibly large and diverse data sets, I was pleased to recently join with you in committing our respective faculty to work together in seeking big data partnership opportunities.

BOCA GRANDE OUTREACH OFFICE

Boca Grande, FL 33921

PO Box 870

(941) 855-9251

ELIZABETH MOORE INTERNATIONAL CENTER FOR CORAL REEF RESEARCH & RESTORATION 24244 Overseas Highway Summerland Key, FL 33042

(305) 745-3554

874 W.R. Mote Way Sarasota, FL 34240 (941) 388–4541

RESEARCH PARK

MOTE AQUACULTURE

MOTE CORAL REEF EXPLORATION EXHIBIT AT THE FLORIDA KEYS HISTORY & DISCOVERY CENTER

82100 Overseas Highway Islamorada, FL 33036 (305) 922-2237 MOTE LIVING REEF EXHIBIT AT THE NATIONAL MARINE SANCTUARY'S ECO-DISCOVERY CENTER

35 East Quay Road Key West, FL 33040 (305) 296–2325

A NONPROFIT ORGANIZATION DEDICATED TO ADVANCING THE SCIENCE OF THE SEA AND A MEMBER OF:

American Academy of Underwater Sciences • Arts & Cultural Alliance of Sarasota • Association of Zoos & Aquariums • Association of Marine Laboratories of the Caribbean • Consortium for Ocean Leadership • Economic Development Council of Sarasota County • Florida Institute of Oceanography • Florida Ocean Alliance • Greater Sarasota Chamber of Commerce • Gulf of Mexico Coastal Ocean Observing System • International Association of Aquatic & Marine Science Libraries & Information Centers • International Consortium for Marine Conservation • National Association of Marine Laboratories Science & Environment Council of Sarasota County • Sea Grant • Southeast Coastal Ocean Observing Regional Association • Southern Association of Marine Laboratories The proposed New College MS-ADS degree encompasses a variety of courses covering a wide range of topics directly applicable to enhancing our understanding of both natural and anthropogenic forcing functions in marine and coastal ecosystems. As such this new degree program will not only provide in-depth practical and technical training designed to position graduates for career success in this vitally important and fast-growing field, but significantly increase our ability to translate and transfer the outcomes of complex research for applied impact use by elected officials, policy-makers and the public at large.

Please don't hesitate to let me know how I might impress upon both the Florida State University System Board of Governors and the Southern Association of Colleges and Schools Commission on Colleges how important it is that they approve the New College MS-ADS degree program.

Respectfully,

Michael P. Crosby, Ph.D. President & CEO

BOCA GRANDE OUTREACH OFFICE ELIZABETH MOORE INTERNATIONAL CENTER

PO Box 870 Boca Grande, FL 33921 (941) 855-9251 FOR CORAL REEF RESEARCH & RESTORATION 24244 Overseas Highway Summerland Key, FL 33042 (305) 745-3554

MOTE AQUACULTURE Research Park

> 874 W.R. Mote Way Sarasota, FL 34240 (941) 388-4541

MOTE CORAL REEF EXPLORATION EXHIBIT AT THE FLORIDA KEYS HISTORY & DISCOVERY CENTER

82100 Overseas Highway Islamorada, FL 33036 (305) 922-2237

MOTE LIVING REEF EXHIBIT AT THE NATIONAL MARINE SANCTUARY'S ECO-DISCOVERY CENTER

35 East Quay Road Key West, FL 33040 (305) 296-2325

A NONPROFIT ORGANIZATION DEDICATED TO ADVANCING THE SCIENCE OF THE SEA AND A MEMBER OF:

American Academy of Underwater Sciences • Arts & Cultural Alliance of Sarasota • Association of Zoos & Aquariums • Association of Marine Laboratories of the Caribbean • Consortium for Ocean Leadership • Economic Development Council of Sarasota County • Florida Institute of Oceanography • Florida Ocean Alliance • Greater Sarasota Chamber of Commerce • Gulf of Mexico Coastal Ocean Observing System • International Association of Aquatic & Marine Science Libraries & Information Centers • International Consortium for Marine Conservation • National Association of Marine Laboratories Science & Environment Council of Sarasota County • Sea Grant • Southeast Coastal Ocean Observing Regional Association • Southern Association of Marine Laboratories



UNITED STATES DEPARTMENT OF COMMERCE National Institute of Standards and Technology Gaithersburg, Maryland 20899

Date: January 13, 2021

Dear President O'Shea,

I am excited to write in support of the new Masters in Applied Data Science program at the New College of Florida.

As a research scientist at the National Institute of Standards & Technology, I have led and participated in many workshops and committees focused on U.S. workforce development. These studies, as well as the White House AI initiative and the Materials Genome Initiative, recognize that there is a dearth of scientists and engineers with data science skills. This has also been expressed to me by numerous industry managers. The need for a data science educated workforce will only grow over the next decade as advanced sensors are further integrated throughtout industry, exponentially increasing the amount of data collected. The Masters in Applied Data Science program will clearly be an important step forward in ensuring a competitive U.S. economy.

If awarded, I plan to support the effort by contributing real world data analysis challenges for the students and professors.

Aaron Gilad Kusne Research Scientist Materials for Energy and Sustainable Development Group National Institute of Standards and Technology

Adjunct Associate Professor Department of Materials Science and Engineering University of Maryland





January 12, 2021

Dr. Donal O'Shea, President New College of Florida 5800 Bay Shore Road Sarasota, FL 34243

Dear President O'Shea,

We, the undersigned, are pleased to write in support of the development of a new Master's degree in Applied Data Science.

Novetta delivers scalable advanced analytic and technical solutions to address challenges of national and global significance. We are a recognized leader in technology-enabled services, solving complex technical and analytical challenges for the National Security and Defense communities. We help customers find clarity from complexity in dealing with massive disparate datasets.

Novetta has enjoyed a significant relationship with New College of Florida's Data Science Department since 2018. Our ability to deliver a unique combination of talent and technology is a key driver of our success. We have been impressed with the leadership of both Dr. McDonald and Dr. Bozkaya and the department's ability to produce well qualified candidates, many of whom we have hired. As partners, our participation in the Practical Data Science course has proven productive.

Our mission to solve problems of national significance predicates Novetta's own applied approach to data science. We believe data science must be taken out of the lab in order to achieve empowering results. A Master's program focused on Applied Data Science will produce strong candidates with the ability to deliver disruptive and innovative solutions. These are the types of candidates we need in order to fulfill our mission.

We look forward to continuing our relationship with NCF. We are supportive of the creation of the Master's program in Applied Data Science.

Sincerely,

Butip

Tiffanny Gates President & CEO Novetta

A.M.

Rob Sheen SVP, Client Operations Novetta



Dr. Donal O'Shea President, New College of Florida 5800 Bay Shore Road Sarasota, FL 34243

Dear President O'Shea,

I am pleased to write in support of the new MS in Applied Data Science program at New College of Florida planned for the next academic year.

As you might know, at NVIDIA, we push the boundaries of technology in high-performance computing with the use of graphics processing units known as GPUs. This technology has opened a whole new frontier in analyzing massive datasets, which find applications in areas such as computer vision, medical imagery and cancer detection, satellite imagery and agriculture, object detection and autonomous vehicles, to name a few. With such an expansion in big data and the computing power to process it, the field is now in an ever-growing need of qualified data scientists, the likes of which would be expected to graduate from your new program.

In the last 18 months, we have had a fruitful collaboration with New College of Florida where we established NVIDIA Deep Learning Institute University Ambassadorship with Prof. Burcin Bozkaya. Through this program, many New College students have completed certification courses including Computer Vision using Deep Learning and Accelerated Machine Learning with RAPIDS. These certifications clearly equip young data scientists with the skills marketable in the professional world of data science. We would be more than happy to continue this collaboration with the new MS in Applied Data Science program and develop new initiatives as well.

It is clearly extremely critical to educate and graduate highly skilled data scientists for the professional as well as academic world. We have our full confidence that your new program is set out to accomplish this and we would be more than happy to support this program in many years to come. We also look forward to working with your faculty and the students of the new MS in Applied Data Science program.

Sincerely,

Joe Bungo 1465A334BA74470... Joe Bungo

DocuSigned by:

Deep Learning Institute Program Manager 08 January 2021

2788 San Tomas Expressway | Santa Clara, CA 95051 | T 408.486.2000 | F 408.486.2200 | www.nvidia.com



Riff Analytics 44 Fenno Rd | Newton MA | 02459 +1 617-340-9993

Dr. Donal O'Shea President, New College of Florida 5800 Bay Shore Road Sarasota, FL 34243

Dear President O'Shea,

I am pleased to write in support of the development of a new Master's degree program in Applied Data Science at New College of Florida.

As you may be aware, Riff Analytics has worked with Prof. Burcin Bozkaya, a faculty member at NCF, to provide meaningful internship experiences for NCF students over the past year. In addition, we have donated funds to New College in support of programming. We have been enormously impressed with the quality of student work and the tireless efforts of Dr. Bozkaya to support students in our work together.

While there has been a marked increase in the number of data science courses and programs in the last decade, there continues to be many fewer qualified Data Science Master's graduates to fill available jobs in the US and globally. By some reports, the number of Data Science jobs — positions that require meaningful training and expertise in data science techniques — has grown by 650% since 2012. A 2018 study by LinkedIn estimated that there were *a minimum* of 150,000 data science vacancies in the US job market alone at that time... and growing.

It is more important than ever to provide a Master's program aimed at educating students to become skilled data analysts ready to work across disciplines in support of research and development, especially in applied domains. These graduates will be welcomed by employers in many different industries, including our own.

Best of luck getting your new Master's program started. We look forward to continuing our work with Dr. Bozkaya and the students in the New College of Florida Applied Data Science program.

Sincerely

in Biz

Elizabeth Porter CEO, Riff Analytics



1680 Fruitville Road Suite 402 Sarasota, FL 34236 (*t*) 941-309-1200 · (*f*) 941-309-1209 · <u>www.edcsarasotacounty.com</u>

January 7, 2021

Dr. Donal O'Shea, President New College of Florida 5800 Bay Shore Road Sarasota, FL 34243

Dear President O'Shea:

I am pleased to write in support of the plans to launch a new master's program MS in Applied Data Science at New College of Florida in Fall 2021. The new program, as I understand, will have 11 courses offered as well as internship opportunities, industrial seminars, workshops and certifications. These components, I believe, are well suited to boost the applied nature of the program.

The Applied Data Science program will create a sophisticated workforce that will greatly benefit local employers, as well as generate interest from businesses considering the region for any number of activities. Education and workforce are at the forefront of economic development, and this program will provide a competitive edge for our students and businesses.

We wish you all the success with the new MS in Applied Data Science program. We look forward to continuing the dialog concerning well-trained data analysts as soon as possible.

Sincerely,

Destin Wells

Vice President, Business Development Services Economic Development Corporation of Sarasota County 1680 Fruitville Road, Suite 402 Sarasota, Florida 34236 Office: (941) 309-1200 ext. 101 Fax: (941) 309-1209 dwells@edcsarasotacounty.com http://www.edcsarasotacounty.com



January 12, 2021

Dr. Donal O'Shea, President New College of Florida 5800 Bay Shore Road Sarasota, FL. 34243

Dear President O'Shea

I am pleased to provide this letter in support of the development of a new Master's degree program in Applied Data Science at New College of Florida. I currently reside in the Education Division of SAS on the Academic Programs team. In brief, our mission is to support post-secondary educators in their teaching of analytics related topics and in the development of new analytics curricula, while incorporating SAS tools. The SAS Academic Program delivers technology and resources (e.g., curriculum development support, teaching kits, training/workshops) for teaching and learning at no cost to educators and learner. Our ultimate goal is to make connections between students with SAS skill and our customers (including a majority of Fortune 500 companies) who are hiring early career analytics talent.

As a best practice, our team uses current labor market data to align post-secondary course and curriculum learning objectives with workforce needs. We partner with Emsi, a labor market analytics company, which allows us to provide comprehensive and current information about job postings, compensation, companies, skills, etc. For example, from January to December 2019, there were over 8,000 unique job postings (roughly 46,000 total job postings with each unique position posted an average of six times each) desiring SAS skill within the state of Florida. The top five companies hiring for these positions included Anthem (1,812 unique posts), The Walt Disney Company (268 unique posts), Bank of America Corporation (225 unique posts), Citigroup Inc. (197 unique posts) and Wellcare Health Plans, Inc. (170 unique posts).

To date, our team has worked with New College of Florida faculty and students in a variety of ways to support analytics teaching and learning. For example, we have conducted onsite workshops to prepare students for industry certification exams, enabled faculty to use free SAS tools, technologies, and teaching materials in the classroom, and more recently, have agreed to take on a role as an external advisory board member. I look forward to continuing to work with New College of Florida faculty to develop courses, utilize our free resources, train students, and facilitate talent connections for the graduates of the new MS in Applied Data Science program.

Sincerely,

Carr

Cheryl Cass, PhD Senior Global Academic Program Manager, SAS Education Adjunct Associate Professor at North Carolina State University

100 SAS Campus Drive Cary, NC 27513 USA

T +1 919 677 8000 F +1 919 677 4444

To contact your local sales office, please visit: sas.com/offices



600 Tallevast Rd., #202, Sarasota, FL 34243 941.234.0001 • www.Star2Star.com

Monday, January 18, 2021

Donal O'Shea, President New College of Florida 5800 Bay Shore Road Sarasota, FL 34243

Dear President O'Shea,

I am pleased to write in support of the development of a new Master's degree program in Data Analytics at New College of Florida.

Almost thirty years ago, I arrived in Sarasota, having started and successfully exited several high technology companies in California. I came here thinking it would be easy to replicate that success in Sarasota. In California, Silicon Valley was the natural locus for tech companies. The weather was nice, there were lots of recreational and cultural attractions and there was no shortage of well trained employees. Sarasota has plenty of the first two attributes but is behind in educational programs that produce the kinds of graduates companies like mine seek and -- all too often -- must recruit from elsewhere.

For this reason, I strongly support the development of a new Master's degree program in data analytics and machine learning. I have long advocated for programs that prepare our students for the challenges of work in the twenty-first century. To my mind, a Master's degree in data sciences is a highly focused example of this sort of initiative.

As more and more company CEOs and Boards of Directors turn their eyes toward Florida as the place to start or grow, programs that produce on point graduates will encourage such decisions and, in turn, lead to a virtuous circle of more startups, more great jobs and, yes, Master's programs in other areas as well.

Best regards,

Norman Worthington, CEO

14 January 2021

Dr. Donal O'Shea, President New College of Florida 5800 Bay Shore Road Sarasota, FL 34243

Dear President O'Shea,

I am honored to be able to provide my support in the development of a new Master's degree program in Data Analytics at New College of Florida, the State's honors college.

I personally referred Dr. Burcin Bozkaya to the faculty, and Dr. Patrick McDonald is a superb computer scientist and educator. I have met some of the other faculty over the years and continue to think highly of them and of the students who they mentor.

As you may be aware, alumna Vicki Raeburn introduced me to New College several years ago, and I have been working with the institution ever since. I and my business partners have recruited and placed several interns and permanent hires out of New College data science into a series of venture capital-backed MIT spinout companies we have created, and look forward to a continued collaboration in that regard.

In addition, in our edtech company we are developing a research stream around human factors analysis, which Dr. Bozkaya is intimately familiar with, and anticipate bringing in New College as an academic collaborator. We also are launching a new ethical data/ethical AI private research and commercialization institute in London, and likewise anticipate opportunities to fund translational projects out of New College in concert with that.

The world needs more professionals versed in data analytics, and it's heartening to see New College stepping up to answer the call.

Best,

David Shrier Managing Director, Visionary Future LLC CEO, Adit EdTech Acquisition Corp. (NYSE: ADEX.U) CEO, Esme Learning Solutions, Inc. Chief Scientist, Leviathan Institute Professor of Practice, Imperial College Business School Editor, MIT Press / MIT Connection Science & Engineering

APPENDIX H — 4th Year Check-in Career Planning Survey and Student Interest Indicators

This short check-in survey is administered each January by New College of Florida's Center for Career Engagement and Opportunity to expected May graduates.

Survey Questions:

- 1. What is your career plan immediately following graduation?
- 2. Related to your immediate career plan, what industries, jobs, employers, graduate programs, or other options you are considering? List any/all ideas.
- 3. What are your long term career goals (5-10 years from graduation)?
- 4. What are you doing right now to advance towards your career goals? Check all that apply.
- 5. How can the CEO help you next? Check all that apply.

In each of the past four years, more than five New College graduating seniors have indicated plans to attend master's programs in Data Science. If we include closely related fields, that number increases to 10 New College graduates per year.

APPENDIX I — Rubrics to assess practicums and projects

New College of Florida Applied Data Science Practicum Assessment Guidelines

This document provides guidelines for the use of the New College Applied Data Science Practicum Assessment rubric. The assessment rubric involves the evaluation of student performance in three categories (technical skills, teamwork, and communication) as well as a summary evaluation of overall student performance as a member of a data science team. Each evaluation includes a narrative component, the use of which is discretionary.

Evaluation of technical skills

- 1. Students are expected to be proficient programmers in both Python and R.
 - a. Students should be able to acquire and clean data.
 - b. Students should be able to extract and analyze information from data to answer questions about the data
- 2. Students are expected to have a working knowledge of data storage and retrieval.
 - a. Students should be able to query a database.
 - b. Students should be able effectively manage computational complexity and in so doing demonstrate a working knowledge of scalable resources.
- 3. Students are expected to have a working knowledge of software development.
 - a. Students should be able to elicit the needs of the data owner.
 - b. Students should be able to design and implement a software artifact for the synthesis, storage and analysis of data.
- 4. Students are expected to have a working knowledge of statistical inference and problem solving.
 - a. Students should be able to design an experiment to test a hypothesis, with clear quantification of uncertainty.
 - b. Students should be able to isolate and implement appropriate statistical learning protocols.
 - c. Students should be capable of constructing and testing models intended to address a given problem.

Evaluation of communication and reporting

- 1. Students are expected to communicate effectively in writing
 - a. Reports are concise and appropriately targeted.
 - b. Reports are well organized with clearly defined and supported theses.
 - c. Reports demonstrate clean mechanics with evidence of proofreading.
- 2. Students are expected to communicate effectively orally
 - a. Presentations effectively gauge audience and hold audience interest.
 - b. Presentations are well organized with clearly defined and supported theses.
 - c. Presentations effectively employ technology.
- 3. Students are expected to make effective use of visualization.
 - a. Visualizations support theses and highlight important features of data.
 - b. Visualizations consistently employ the correct tools for required task completion, with design choice connected to decision processes.

Evaluation of teamwork

- 1. Students are expected to assume ownership of associated tasks.
 - a. Students should assume an average number of assignments.
- 2. Students are expected to be available and on time for meetings.
- 3. Students are expected to communicate effectively within the team.
 - a. Communication should be frequent.
 - b. Communication should be clear, focused and effective.
- 4. Students are expected to exhibit a positive attitude.
 - a. Students should be easy to approach and work with.
 - b. Students should assist others when possible.
- 5. Students are expected to complete assigned tasks.
 - a. Task completion should be timely.
 - b. Completed tasks should be of high quality.

Cumulative assessment

The cumulative assessment is intended to describe the extent to which the student has, by the end of the practicum, reached maturity as a working member of a data science team. In order for this to be the case, students should demonstrate technical competence, strong communication skills, and the willingness and ability to serve on a team. The summary assessment should be informed by the individual assessments in each of the preceding categories.

Technical skill

Feature	Does not meet expectations	Meets expectations	Exceeds expectations	Not applicable
Python and R				
Data Storage and Retrieval				
Software Engineering				
Inference and Problem Solving				

Communication and reporting

Feature	Does not meet expectations	Meets expectations	Exceeds expectations	Not applicable
Written reports				
Oral presentations				
Visualization				

Teamwork

Feature	Does not meet expectations	Meets expectations	Exceeds expectations	Not applicable
Acceptance of workload				
Communication				
Attitude				
Task completion				

Cumulative Assessment

Feature	Does not meet expectations	Meets expectations	Exceeds expectations	Not applicable
Functions as a productive team member				

Written Work Rubric

Task

1451			1	1	
Introduction and thesis	No clear introduction; No articulated structure	Includes a statement of purpose, but structure is unclear and thesis undeveloped	Clear statement of purpose; articulated structure	Clear and concise statement of purpose, engaging motivation, articulated structure	NA
Organization	Failure to develop ideas; no clear global structure	Evidence of organization, but significant missing detail	Main ideas of each paragraph developed; clear evidence of global structure	All paragraphs fully developed; logical sequencing of ideas with smooth transitions	
Content	Significant missing details.	Most ideas supported with evidence	All main ideas supported with evidence	Well chosen supporting details	
Mechanics	Many grammatical and spelling errors. Significant problems with sentence structure	Some errors in grammar and structure	Well-formed sentences and paragraphs; clearly proof read, but some errors	No errors in punctuation and spelling. Carefully constructed, stylized sentences and paragraphs	
Conclusion	Incomplete and lacking synthesis.	Some unsupported conclusions	Clear restatement of thesis; all conclusions supported	Clear restatement of thesis; all conclusions strongly supported	
References	Missing	Incomplete	Complete	Complete and correctly formatted	

Oral Presentation Rubric

Task

Audience Awareness	Fails to gauge audience; fails to communicate a thesis	Effectively communicates some points to most audience members	Effectively communicates most points; holds audience attention	Continually engages all audience members and communicates all major ideas.	NA
Organization	Presentation is disjointed; thesis and main points largely undeveloped.	Evidence of organization, but significant missing detail/data; missing summaries.	All ideas developed and supported with data; Summaries present.	All main ideas strongly supported and clearly communicated. Presentation structured to support thesis. Summaries informative and complete.	
Content	Significant missing details. Purpose undefined.	Thesis present, but weakly supported. Examples poorly chosen.	Thesis with some evidence. Clear on statistical and computational details	Well chosen supporting details. Concise, clear and complete analysis	
Technology	Inappropriate and incomplete use of technology. Incorrect on details	Missing some details of analysis. Lacking appropriate visualization.	Clear on details that are illustrated by example. Some visualization	Graphics and examples to clearly illustrate details. Strong visualization.	
Delivery	Fails to engage, nervous, no eye contact.	Some discomfort visible, some trouble with eye content, volume.	Able to recover and think on feet; satisfactory use of volume and inflection. Consistently engaging.	Relaxed and confident with clear mastery of material. Excellent use of movement, eye contact and voice. Keeps audience engaged	

Visualization

Task					
Purpose and audience	Incorrect tools for audience and purpose	Correctly identified tools which are improperly applied	Appropriate tools properly applied, but insufficient or purpose.	Correct choice of tools, correctly applied.	NA
Effectiveness	fails to support thesis or project. Distracts from the goal or decision process.	Visualization provides some support for the project and decision process.	Visualization clearly supports the project and decision process.	Visualizations is compelling and informative; an essential part of the explanation or decision process.	
Content	Missing important variables and relationships.	Visualization contains an overview of data, but short on filters and details	Overview with variable filters; some details available on demand	Overview with all important variables and relationships available on demand.	
Clarity	Data sets are not clearly distinguished or described.	All components carefully labeled. Whitespace and clutter minimized.	Highlighting of distinctive features of the data. Informative captions and labels	All essential details and relationships available on demand.	
Execution	Missing variables and labels; inappropriate design choice for variables and relationships.	Design choices that identify essential variables and relationships.	Design choices connected to decision process; filters and some details on demand.	Fully interactive graphics to inform decisions. Appropriate use of dashboards to provide only necessary details.	

Teamwork Rubric

Task

Ownership Of Work Load	Accepted ownership for few tasks	Accepted ownership for fewer tasks than average	Accepted ownership for average number of tasks	Accepted ownership for more tasks than average	NA
Effective Communication	Little or no attempt to communicate with others	Communication attempted but ineffective.	Communicates frequently and effectively	Communicates effectively and encourages others	
Timely Completion Of Tasks	Rarely completes tasks without reminders	Usually does assigned work without reminders	Always does assigned work without reminders	Always completes work ahead of deadlines	
Quality Completion Of Tasks	Work usually requires revisiting	Work usually satisfactory	Work always satisfactory	Work always exceeds requirements	
Attitude	Rarely displays a positive attitude	Occasionally displays a positive attitude	Usually displays a positive attitude	Always displays a positive attitude	
Assists Others	Rarely Assists Teammates	Provides Some Assistance to teammates	Usually assists teammates	Never assists teammates	