Program Announcement
New Jersey Institute of Technology
Conversion of the Financial Technology Concentration

I. Objectives

New Jersey Institute of Technology (NJIT) proposes a Bachelor of Science in Financial Technology (FinTech) in order to prepare students for careers in the emerging and growing industry of FinTech, which has been disrupting the traditional delivery of financial services through rapid integration of technology, algorithms, data and mobile applications.

Today, FinTech is considered to be one of the most important industries in the global economy, with over 50 billion USD of investment in start-up companies in 2018 alone [1], the largest skills gap with 1.5 million positions created, and the highest paid salaries (e.g., $130,000 and more of annual salary with 2-4 years of experience in the U.S.[2]). FinTech has brought an unprecedented demand for professionals with advanced skills in finance, mathematics, programming, analytics, data science, applied statistics, and regulatory and compliance, and will eliminate some 30% of banking jobs [3]. In the U.S. alone, over 7,000 bank branches have been closed, resulting in 425,000 job losses in financial services [4]. Experts believe that FinTech will replace most brick and mortar financial services within the next decade, and the demand in the job market for FinTech professionals will continue to accelerate.

These recent major changes in the financial sector necessitate the Martin Tuchman School of Management (MTSM) to revamp its business programs and integrate financial technology knowledge into its business curriculum, with the help of faculty who have expertise in the field.

The effort started with declaring a concentration in FinTech in its B.S. in Business degree. Students concentrating in FinTech have been successfully participating in internships in high technology and financial services sectors. Over 80% of our students are placed as full-time employees at local and regional companies where they intern. Employers of our recent graduates include J.P.Morgan Chase, Prudential Financial, Barclays, and so on. Our graduates typically start their careers in departments of operations, trading and sales. Based on the number of students who decided to take this concentration and the demand by companies in the great New York metro area, MTSM has decided to propose a stand-alone degree program in the B.S. in FinTech. This decision aligns with NJIT's role as a polytechnic institution that confers degrees denoting a high return on investment.

The proposed degree program will not only include traditional finance coursework, but also provide an in-depth knowledge and understanding of the theories and evolution of FinTech, data-driven financial modeling, financial data mining and machine learning, financial data analytics, and new innovations in the financial sector, including AI, blockchain, bitcoin, cloud computing, machine learning, IoT, crowd funding, P2P lending, etc.

The primary goal of the program is to develop students who have the necessary skills and knowledge to pursue competitive professional and academic careers. It builds mainly on the existing assets of the B.S. in Business degree program. The establishment of the proposed FinTech program will fulfill the market needs for financial technology, but will also contribute to the innovation economy of New Jersey [5]. It is expected that the variety and volume of companies recruiting from our program to increase significantly, since many incumbent financial services institutions have been realizing the importance of collaborating with schools to attract more talented and skilled candidates. Graduates from this program may work for FinTech startups which concentrate in cryptocurrency management and trading, blockchain technologies, open banking, insurtech, Robo-advisement, machine learning and data mining applications and cybersecurity. Some may work for traditional financial services companies, which are in need of staff with technical skillsets to improve existing business practices and/or develop new processes related to technological innovations.

II. Evaluation & Assessment Plan for the program.

All NJIT courses and degree programs are assessed regularly and systematically. Furthermore, as part of the requirements of being an accredited business school by the AACSB (Association to Advance Collegiate Schools of Business), every year the MTSM goes through a rigorous program evaluation and assessment of all of its graduate and undergraduate programs. The proposed B.S. in FinTech program will be assessed in accordance with the institution's and AACSB's existing assessment standards and practices to ensure continuous program improvement.

Assessment results are analyzed, disseminated, and utilized by the faculty for the purposes of curriculum planning and the improvement of teaching and learning.

The assessment plan involves the following steps:

- The assessment and revision of learning goals, objectives and outcomes at the school level and for the FinTech degree program.
- The development and use of direct and indirect assessment methods, instruments, and the criteria for proficiency.
- Annual data collection, analysis and reporting to the Undergraduate Curriculum Committee for curriculum planning and the improvement of teaching and learning.

- Closing the loop by integrating the recommended changes to the B.S. in FinTech curriculum.

Students in the FinTech program should anticipate the acquisition of skills, knowledge, and professional training that enable them to pursue careers in finance, technology, and entrepreneurship such as investment banking, international finance, commercial banking, sales and trading, information technology, social entrepreneurship, etc.

At the institutional level, the Office of Institutional Effectiveness (OIE) is responsible for assessment oversight at NJIT. The OIE works with individual academic divisions and units in order to assess academic programs on a regular basis in an effective, structured, and reliable manner.

The proposed B.S. in FinTech has been designed based on program goals, learning objectives, as well as students learning outcomes. Figure 1 displays a summary of the assessment and evaluation plans. Tables 1 and 2 present the assessment plans for the program goals, objectives, and student learning outcomes, respectively, designed to achieve all related professional as well as institutional requirements.

II.A. FinTech Program Goals

There are three comprehensive program goals (PGs).

1. Provide students with a broad systematic understanding of finance and new technologies, as well as the application of this knowledge to improve the efficiency and deployment of traditional financial services. [PG1]
2. Support NJIT's mission of excellence in education, research, economic development, and service. [PG2]
3. Develop and sustain a baccalaureate degree program that can broaden the existing business disciplines, has growing and enduring professional demand, and is aligned with the educational standards articulated by the AACSB. [PG3]

II.B. FinTech Program Objectives

The program is comprised of four student learning objectives (POs), which will be integrated into the existing assessment structure of MTSM.

1. Understand foundational knowledge of the financial technology discipline. [PO1]
2. Demonstrate proficiency in using key financial software and technology tools. [PO2]
3. Communicate effectively in a business environment. [PO3]
4. Demonstrate critical/integrative thinking skills in business problem-solving and decision making. [PO4]

II.C. FinTech Student Learning Outcomes

In addition to goals and objectives, the proposed B.S. in FinTech includes two sets of student learning outcomes: (1) program-specific and (2) institutional (i.e., NJIT).

II.C.1. Program-Based Student Learning Outcomes

The FinTech program-based learning outcomes (LOs) are organized by the program objectives articulated in Section II.B. Students earning a B.S. in FinTech from NJIT will be able to:

1. Employ key concepts in financial technology, including Artificial Intelligence, blockchain technology, cloud computing, financial data, and financial management in analyzing business opportunities and challenges. [LO1]
2. Use data-driven financial modeling in the area of payments, banking, insurance and investment analysis and management. [LO2]
3. Act ethically and in compliance with regulations in professional settings such as FinTech startup companies, mergers and acquisitions of traditional and FinTech financial institutions. [LO3]

2.1. Use advanced Excel skills in financial decision making. [LO4]

2.2. Develop programs using languages such as R/Python to perform financial data analysis. [LO5]

2.3. Proficiently apply database management technologies, modeling software, and machine learning tools. [LO6]

2.4. Use document collaboration tools, such as SharePoint and Dropbox, communication tools such as email, social media, and Webex, and career development tools such as LinkedIn. [LO7]

3.1. Write organized, clear and concise reports, and analyses. [LO8]

3.2. Make effective, clear, and informative oral presentations both in face-to-face and online forums. [LO9]

4.1. Recognize facts and identify problems accurately. [LO10]

4.2. Evaluate alternative solutions to problems and propose possible actions. [LO11]

For a summary of the program-based student learning outcomes, and in order to view their mapping onto the program objectives, please see Table 2.

II.C.2. NJIT's General Education Requirement (GER) Student Learning Outcomes

NJIT is dedicated to producing graduates who have the knowledge, skills, and motivation necessary to advance the state-of-the-art knowledge in their respective fields in addition to possessing a devotion to lifelong personal development as well as intellectual discovery beyond their discipline. Graduates must possess outstanding communication skills and understand the complexities of contemporary society and the ethical and societal issues involved in the professional pursuit of their discipline. Graduates must also possess a deep understanding of and appreciation for science and technology. The General Education Requirements (GER) are designed to be the dynamic yet minimal foundational curriculum encompassing the necessary preconditions for success in undergraduate disciplines as well as the breadth of knowledge demanded by contemporary society.

There are five NJIT GER student learning outcomes (GERs):

1. Effectively communicate ideas orally and in writing, as informed by the tenets of a liberal arts education (Liberal Arts Literacy). [GER1]

2. Use logical reasoning and a scientific approach to support conclusions based on empirical evidence (Scientific Literacy). [GER2]
3. Form conclusions that are supported logically by the principles of qualitative and quantitative reasoning, probability, and statistics (Quantitative Literacy). [GER3]
4. Demonstrate the ability to use computing systems in order to access, store, process and analyze information as an essential aspect of critical thinking and problem solving (Computing Literacy). [GER4]
5. Identify and articulate the multifaceted relationships between the economic, social and political forces that inform and structure society as well as an individual's place within it (Social Science Literacy). [GER5]

For a summary of the institutional student learning outcomes, and in order to view their mapping onto the program objectives, please see Table 2.

Figure 1. Program Evaluation and Outcome Assessment Hierarchical Summary

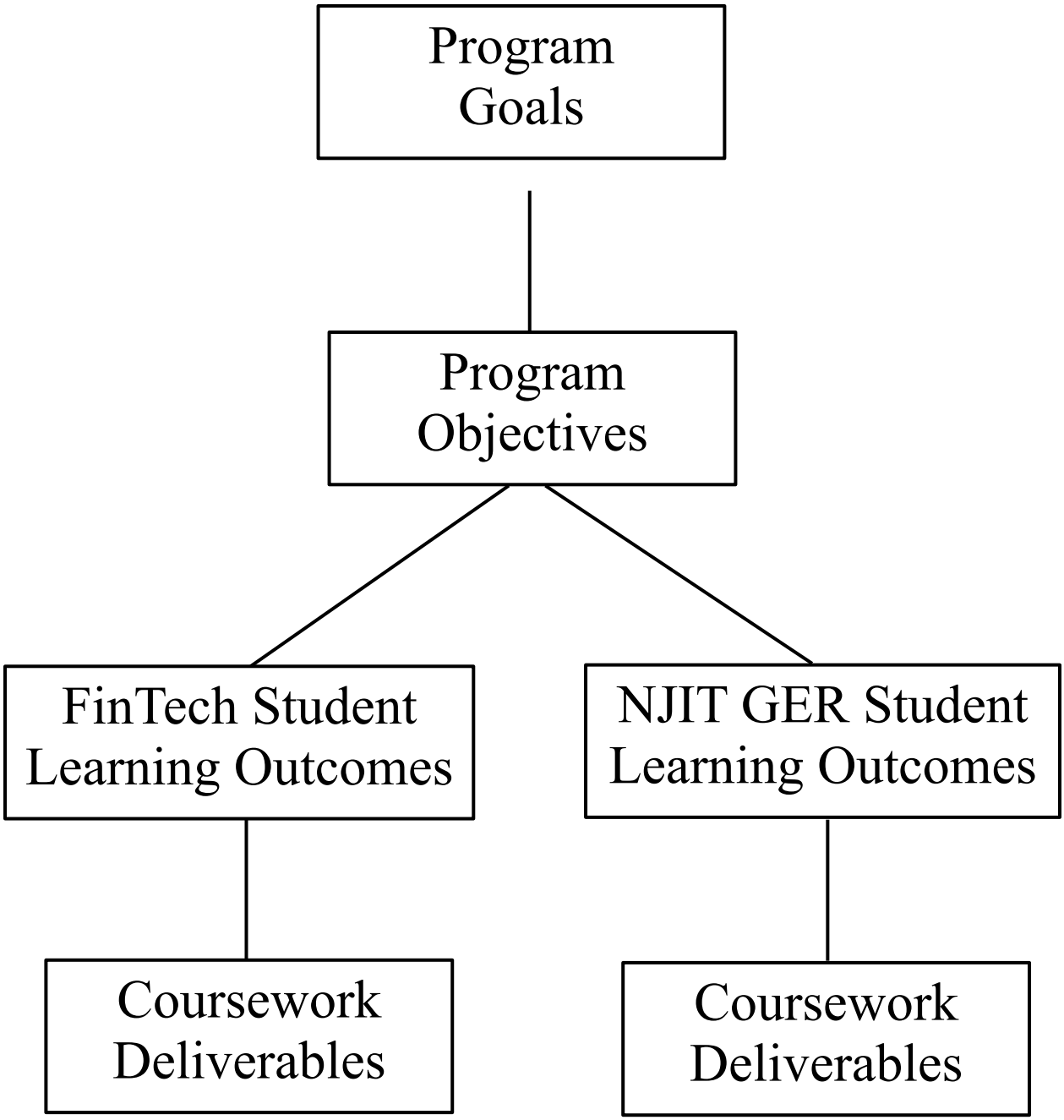

Table 1. Evaluation of FinTech Program Goals

Program Goals	Measures
PG1: Provide students with a broad systematic understanding of finance and new technologies, as well as the application of this knowledge to improve the efficiency and deployment of traditional financial services.	▪ Performance of students in classes ▪ Student satisfaction surveys. ▪ Student, alumni, and employer surveys ascertaining employment, career placement, and career advancement. ▪ Exit interviews.
PG2: Support NJIT's mission of excellence in education, research, economic development, and service.	▪ Student placement upon graduation ▪ Successful recruitment and enrollment of gender and racially diverse students.
PG3: Develop and sustain a baccalaureate degree program that can broaden the existing business disciplines, has growing and enduring professional demand, and is aligned with the educational standards articulated by the AACSB.	▪ Surveys ascertaining employment and salary 1, 5, and 10 years after graduating the program. ▪ Regularly scheduled program assessment and review per AACSB guidelines.

Table 2A. Curriculum Map & Assessment of Programmatic & Institutional Student Learning Outcomes

Program Objectives	Student Learning Outcomes	Courses	Assessment
PO1: Demonstrate foundational knowledge of the financial technology discipline.	**LO1:** Employ key concepts in financial technology, including Artificial Intelligence, blockchain technology, cloud computing, financial data, and financial management in analyzing business opportunities and challenges. **LO2:** Use data-driven financial modeling in the areas of payments, banking, insurance and investment analysis and management. **LO3:** Act ethically and in compliance with regulations in professional setting such as FinTech startup companies, mergers and acquisitions of traditional and FinTech financial institutes. **GER3:** Form conclusions that are supported logically by the principles of qualitative and quantitative reasoning, probability, and statistics. **GER5:** Identify and articulate the multifaceted relationships between the economic, social and political forces that inform and structure society as well as an individual's place within it.	Financial Markets & Institutions Fundamentals of Corporate Finance Blockchain Technology for Business Data-Driven Financial Modeling Investments Management Financial Data Analysis Data Mining & Machine Learning AI for Business Decisions Business Law I	Exam results Projects with rubrics Case studies with rubrics Homework assignments Quizzes with rubrics Lab reports with rubrics
PO2: Demonstrate proficiency in using key financial software and technology tools.	**LO4:** Use advanced Excel skills in financial decision making. **LO5:** Develop programs using languages such as R/Python. **LO6:** Proficiently apply database management technologies, modeling software, AI and machine learning tools. **LO7:** Use document collaboration tools, such as SharePoint and Dropbox, communication tools such as email, social media, and Webex, and career development tools such as LinkedIn. **GER4:** Demonstrate the ability to use computing systems in order to access, store, process and analyze information as an essential aspect of critical thinking and problem solving (Computing Literacy).	Quantitative Analysis Application Computer Science with Business Problems Introduction to Computer Science I&II Introduction to Management Information System Business Data Analysis Database Systems for Managers Freshman Seminar Career Planning and Major Field Test	Lab reports with rubrics Projects with rubrics Exam results Homework assignments Case studies with rubrics Quizzes with rubrics
PO3: Communicate effectively in a business environment.	**LO8:** Write organized, clear and concise reports, and analyses. **LO9:** Make effective, clear, and informative oral presentations both in face-to-face and online forums. **GER1:** Effectively communicate ideas orally and in writing, as informed by the tenets of a liberal arts education.	English Composition: Writing, Speaking, Thinking I&II Introduction to Business Fundamentals of Corporate Finance	Oral and written assignments with rubrics One-on-one training Case studies with rubrics Exam results

PO4: Demonstrate critical/integrative thinking skills in business problem-solving and decision making.	**LO10:** Consider facts and identify problems accurately. **LO11:** Evaluate alternative solutions to problems and propose possible actions. **GER2:** Use logical reasoning and a scientific approach to support conclusions based on empirical evidence (Scientific Literacy).	Introduction to Business Principles of Marketing Managing Technology and Innovation Fundamentals of Financial Accounting Investments Management Financial Data Analysis Management Science	Quizzes with rubrics Case studies with rubrics Homework assignments Exam results Lab reports with rubrics

Table 2B. Learning Outcomes and Course Map

Course	LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8	LO9	LO 10	LO 11
FIN218 Financial Markets & Institutions	I										
FIN 315 Fundamentals of Corporate Finance	R, A							R, A			
FIN 306 Blockchain Technology for Business	I										
FIN 310 Data-Driven Financial Modeling		I									
FIN 320 Financial Data Analysis		R, A								R, A	R, A
FIN 410 Data Mining & Machine Learning		R, A									
FIN 417 Investments Management		R, A								R, A	
MGMT 416 Artificial Intelligence for Business Decisions	R, A										
MGMT 290 Business Law I			I								
MGMT 116 Quantitative Analysis Application in Business with Lab				I							
MIS 245 Introduction to Management Information System				R, A							
MGMT 216 Business Data Analysis				R, A							
CS 103 Computer Science with Business Problems					I	I					
CS 113 Introduction to Computer Science I					R, A	R, A					
CS 114 Introduction to Computer Science II					R, A	R, A					
MIS 385 Database Systems for Managers						R, A					
Freshman Seminar							I				

MGMT 399 Career Planning and Major Field Test							R, A				
HUM 101 English Composition: Writing, Speaking, Thinking I								I	I		
HUM 102 English Composition: Writing, Speaking, Thinking II								R, A	R, A		
MGMT 190 Introduction to Business									R, A	I	
MRKT 330 Principles of Marketing										I	
MGMT 480 Managing Technology and Innovation											R
AACT 115 Fundamentals of Financial Accounting										I	
ENTR 320 Financing New Venture			R, A								R, A
OM 375 Management Science											R

Note: I is for "Introduced"; R is for "Reinforced"; A is for "Assessed".

II.D. Institutional Learning Goals

In compliance with the accreditation standards and guidelines of the Middle States Commission on Higher Education, NJIT maintains adherence to the following five Institutional Learning Goals (ILGs):

1. Research-Based Inquiry: Students employ methods appropriate to their discipline. [ILG1]
2. Collaboration: Students work effectively in teams, applying multidisciplinary and global perspectives. [ILG2]
3. Ethical Conduct: Students demonstrate professional and civic responsibility, including respect for all individuals. [ILG3]
4. Creativity: Students use heuristics to evaluate, analyze, and synthesize innovative solutions to existing and emerging problems. [ILG4]
5. Professional Readiness: Students exhibit knowledge and skills, and engage in experiences, necessary for professional and personal growth. [ILG5]

In addition to NJIT's institutional accreditation by the Middle States Commission on Higher Education, the proposed degree program is also subject to AACSB accreditation.

The assessment is handled by dedicated faculty and committees. The AACSB committee, the undergraduate curriculum committee, the academic advisor, and the Associate Dean of Academic affairs will work collaboratively to collect and analyze data, as well as develop guidelines and implement changes to improve student learning, and thus closing the loop.

III. Relationship of the Program to the Institutional Strategic Plan & Institutional Impact

III.A. Relationship to Institutional Strategic Plan

NJIT is one of the elite polytechnic universities in New Jersey that is dedicated to engineering, applied science and the management of technology in education. The university programs are career-focused and conduct applied learning. Its strategic plan is based on five strategic priorities, one of which is learning. The learning objectives are:

- *To ensure it[course of study] meets current professional standards, provides a general education to produce the most highly qualified leaders and is delivered by enthusiastic instructors using innovative and effective methods.*
- *To ensure degree programs meet the needs of students and the employment market.*
- *Train students in the competencies of current digital technology related to their majors and integrate this into the general university requirements. This will provide graduates with technological knowledge and skills required by the marketplace.*

Clearly, the proposed B.S. in FinTech degree program aligns well with the objectives of NJIT's technology focused education, and has the same goal of providing students the skills required by (financial services) industry, and will contribute to New Jersey's economic and workforce development.

III.B. Impact on Existing Programs

NJIT encourages colleges and programs to develop collaborative programming to maximize the availability of expertise to students in different fields. The proposed program requires students take three courses from the Ying Wu College of Computing (YWCC). There is an agreement between the YWCC and MTSM in terms of the course offerings.

Students are encouraged to take elective classes that relate to programming, advanced mathematics, and database management. Thus, the proposed program will contribute to the visibility and enrolment of other programs at NJIT. The proposed FinTech degree program will also create opportunities for joint undergraduate research projects, increase the campus wide visibility of finance investment competitions, increase and diversify the memberships to the financial investment club, and allow possible joint publications among business faculty and faculty from other disciplines.

There is significant overlap between the proposed program and the B.S. in Business, where the program is currently offered as a concentration. Once the proposed program is approved, we will closely monitor the shift in demand for the concentration by students. If significantly fewer students opt for the concentration, we will phase it out so that resources can be devoted to the proposed program.

IV. Need

Like many other industries, the use of technology and software in financial services changes the way large companies service their customers, and the type of skills they need from their workforce. There is an unprecedented demand for finance professionals who possess programming, analytics, and data management skills, to make effective business decisions. Over the past several years, the FinTech job market has exploded from below 100,000 jobs in mid 2015 to nearly 600,000 in late 2018. These trends are expected to continue in the

upcoming years as FinTech expands its horizons ant takes over from traditional financial institutions and services (Figure 2) [6]. Goldman Sachs estimates the worldwide FinTech pie to be worth $4.7 trillion [7]. However, many finance programs in the USA focus on teaching traditional finance theories and methods, and are slow in adapting their curricula to the needs in the financial services sector.

As financial technology continues to evolve, having a prepared and knowledgeable FinTech workface is critical for the financial services sector and regional economic growth. In the New York-New Jersey area, although there is a high demand for FinTech professionals, there is a shortage of degrees in FinTech.

Figure 2. The FinTech Job Market

Retrieved from https://builtin.com/recruiting/fintech-recruitment.

IV.A. Impact on Regional Economy.

The State of New Jersey has been investing in workforce education and school systems, to encourage financial know-how. Growing the state's FinTech Ecosystem has been an interest of the Governor and the New Jersey Economic Development Authority. The Governor's recent trip to India to collaborate with Indian FinTech companies is another indicator of potential impact on the regional economy [8]. Additionally, the proposed degree will increase student enrollment from across the state, internationally, and around the Greater New York area. It will also generate a skilled workforce and attract FinTech startups to the region.

IV.B. Relationship to Other Programs in the State & Region

To the best of our knowledge, the New Jersey City University offers the only M.S. degree in FinTech in New Jersey, and New York University has an MBA specialization in FinTech in the region. The two FinTech undergraduate business concentrations are offered by Fordham University and NJIT in the region. The proposed degree will be the first undergraduate B.S. in FinTech degree in the state and region. In addition, being part of a polytechnic university where relentless investments into technology are taking place and faculty with interdisciplinary backgrounds teach along with the availability of computing resources, will make this program sustainable, and an attractive career choice for the New Jersey high school students.

V. Student Enrollment

The prospective students who would be enrolled in the proposed program are high school graduates who are interested in both computing and business disciplines, county college students in associate degree programs in computer science or business, current business students who are in the FinTech concentration, non-business students who minor in business, and computing college students who have the programming and computer science background and are interested in a career in financial services. Moreover, the proposed program may attract a significant number of international students as NJIT and Shanghai LIXIN University of Accounting and Finance are exploring the possibility of establishing a joint undergraduate program in FinTech.

Table 3 shows comparison between traditional finance concentration and FinTech concentration (most freshmen and sophomores haven't declared their concentrations yet) offered in the MTSM. In less than 2 years, the number of students in FinTech concentration

has overtaken that in the traditional finance concentration. As a small management school, these enrollment numbers are encouraging and show the growing interest in the area.

Table 3. Active Students in the FinTech and Finance Concentrations in spring 2020

Year	FinTech Concentration	Finance Concentration
Sophomore	**3**	**1**
Junior	**19**	**12**
Senior	**13**	**13**
Total	**35**	**26**

Projections for the proposed B.S. in FinTech program (see Table 4) are based on anticipated demand. With program marketing to capitalize on innate interest in the degree program, we estimate that the program will have at least 80 majors by the end of the second academic year that it is offered. Building on this momentum, we project an approximate additional 40 majors in the third year, an approximate additional 50 majors in the fourth year, and an approximate additional 60 majors in the program's fifth year. Please note that in year one we anticipate that the 20 students currently pursuing the Fintech concentration within the B.S. in Business will opt for the new major and are thus, counted as continuing students.

Table 4. B.S. in FinTech Enrollment Projections, AYs 2020-2025

Academic year	New Freshmen Enrollment	Transfer Student Enrollment	Continuing Student Enrollment	Estimated Number of Graduates	Total Enrollment
2020-2021	**20**	**0**	**20**	**--**	**40**
2021-2022	**30**	**10**	**40**	**--**	**80**
2022-2023	**40**	**15**	**80**	**--**	**135**
2023-2024	**50**	**15**	**150**	**(55)**	**160**
2024-2025	**60**	**15**	**200**	**(75)**	**200**

V.A. Admission Requirements

There are no special requirements for admission to the B.S. in FinTech program. As with our other undergraduate programs in the MTSM and in complying with NJIT's academic policies, any matriculated student may declare FinTech as a major. Students must maintain a "C" average in their upper-division major courses in order to be certified for graduation.

VI. Program Resources.

In order for the proposed B.S. in FinTech to be a successful program, it is important that the necessary institutional resources are identified and allocated properly. To this end, resources across the following areas will be considered in this section: coursework, faculty, libraries and computing facilities, and classrooms and laboratories.

VI.A. Coursework & Course Development

NJIT is in a strategic position to launch an undergraduate degree program in FinTech. The following courses that are required by the curriculum of the proposed program are currently being offered in the MTSM and other colleges at NJIT:

ACCT115	Fundamentals of Financial Accounting
CS 103	Computer Science with Business Problems
MATH 135	Calculus for Business
CS 113	Introduction to Computer Science I
MGMT116	Quantitative Analysis Appl Bus with Lab
CS 114	Introduction to Computer Science II
MGMT 216	Business Data Analytics
FIN 218	Financial Markets and Institutions
FIN 306	Blockchain Technology for Business (pending approval)
FIN 315	Fundamentals of Corporate Finance
FIN 310	Data-Driven Financial Modeling
FIN 320	Financial Data Analytics
CPT 373	Web App Development for Mobile
ENTR 320	Financing New Venture
MIS 385	Database Systems for Managers
FIN 410	Data Mining and Machine Learning
FIN 417	Investments Management (old title is “Advanced Portfolio Analysis”)
FIN 430	Options and Futures Markets
MGMT 416	AI for Business Decisions (pending approval)

VI.B. Faculty

The most important aspect of offering a new degree in FinTech is the qualifications of the faculty who will be teaching for the program. The FinTech area requires an interdisciplinary background in not only traditional finance concepts, but also in data modeling, data analysis, and programming. In the last five years, NJIT has invested in faculty recruitment from new and cutting edge research areas, including artificial intelligence, machine learning, and Financial Technology. The following business faculty will be participating in the FinTech program (see Table 5).

Table 5. A List of Full-time Faculty Who Will Teach in the Proposed Program

Name	Rank	Area(s)
Anandarajan, Asokan	Professor	Accounting, finance
Bonitsis, Theologos	Associate Professor	Finance, international finance
Chang, Jasmine	Assistant Professor	Blockchain applications for supply chain and finance, business sustainability, and text analytics
Chen, Yi	Professor	Data science, information systems
Ehrlich, Michael	Associate Professor	Financial markets and institutions, commercialization of technology, innovation, entrepreneurship.
Fox, Wayne	Professor of Practice	Finance, blockchain, AI.
Lawrence, Kenneth	Professor	Decision science, business data analytics and research methods
Martin Utrera, Alberto	Assistant Professor	Finance
Shi, Junmin	Associate Professor	Blockchain, financial modeling, data science, supply chain management and Finance
Tamke, William	Senior University Lecturer	Accounting, finance
Tao, Xinyuan	Assistant Professor	Finance, fixed income, investment strategies
Taylor, Ming	Assistant Professor	Accounting, corporate finance, social network analysis
Taylor, Stephen	Assistant Professor	Data fusion, big data analytics, geospatial data processing, tech & business, management, technology and society, social networking analytics
Yan, Zhipeng	Associate Professor	Behavioral finance, risk management, finance, blockchain, textual analysis
Yu, Dantong	Associate Professor	Data science, data mining, FinTech.

All the faculty listed in the table are scholarly active, publish in high quality finance journals, and teach/advise in the Business Data Science PhD program.

Other fulltime faculty and instructional staff within the MTSM also possess relevant expertise in order to make unique contributions to a standalone FinTech degree program. Dr. Cesar Bandera, associate professor of entrepreneurship and a repeat entrepreneur, teaches courses in the growth of technology start-ups. One of his research areas is innovation-driven business incubation. Dr. Shanthi Gopalakrishnan, professor of management, teaches management of technology and business strategies. Her research covers collaborative ventures between universities and industrial organizations. Dr. Cheickna Sylla, professor of management, teaches business research methods, data mining and analysis and project management. His research focuses on socio-technical systems in economics and business, human factors in human/machine systems, and modeling and analysis of information systems.

In addition to our faculty, the PhD students in Business Data Science (BDS) program can provide another addition to instructing. Some PhD students trained with financial data science skills can teach some courses for the program.

VI.C. Computing facilities, equipment, software and datasets

NJIT's libraries, computing facilities and labs housed in the MTSM are satisfactory for the purposes of the proposed B.S. in FinTech.

The Van Houten Library: it offers access to numerous databases and peer-reviewed journals.

Business Analytics and Data Sciences Laboratory: This laboratory is housed in the MTSM and provides the state-of-the-art learning environment necessary to support instruction and research.

Ray Cassetta Financial Analysis Laboratory: This new laboratory is housed in the MTSM, and has over ten Bloomberg Terminals and a trading floor environment to provide students with access to the financial analysis tools and corporate data that is essential for FinTech education.

Venturelink: This is a community hub located at NJIT for technology companies to benefit from knowledge resources, expert mentors and advisors, and use co-working space for meetings and seminars.

Data observatory: This project is in progress.

Software and datasets: programming languages include R, Python, Tableau, Java and Perl. Statistical programming languages include SAS and SPSS. Other commonly used software include Matlab. All the software is free to access for NJIT students. For teaching and training purposes, the following databases are widely used: Bloomberg data, Factiva, and Nexis Uni.

MTSM faculty also have their own datasets that can be used. In addition, NJIT has completely adopted Canvas system for course delivery.

VI.D. Student Clubs

The NJIT Investment Club

This is a student-run association that is committed to educating its members about investing in the stock market for the long term. By managing a real stock portfolio, students develop skills that they can use in real world.

Innovation Acceleration Club (IAC)

The IAC brings students together who want to focus on Innovation and the Commercialization of Technology. Students learn application development, conduct lean startup practices, and commercialization.

New York Society of Security Analyst (NYSSA)

NJIT Martin Tuchman School of Management Chapter. NYSSA is the New York Society of Security Analysts and the chapter aims to promote networking, outreach, and programming among finance and FinTech students.

ACM - The Association for Computing Machinery

The Association for Computing Machinery is the world's largest educational and scientific computing society. The student chapter at NJIT aims to build a community of students interested in the computing sciences, as well as encourage growth in the academic and professional fields.

G-WiCS

NJIT Graduate Women in Computing Society (WiCS) promotes and supports NJIT's growing community of women studying in the fields of computing and technology.

VI.E. Funding

Since the inception of the FinTech concentration, there have been over 450 thousand dollars donated in support of the program, including the formation of the Financial Analysis Laboratory, Bloomberg terminals, and the creation of a real stock investment portfolio.

VI.F. Industry Group

We are forming an industry group consisting of experts from major financial services corporations and FinTech startups. Industry experts will not only provide internship and full-time job opportunities, but also help the MTSM recruit potential students into the program.

VII. Degree Requirements

The FinTech curriculum requires six courses in traditional finance and accounting to help students acquire a deep understanding of financial lingo and services (ACCT115: Fundamentals of Financial Accounting, FIN218: Financial Markets and Institutions, FIN315: Fundamentals of Corporate Finance, FIN417: Investments Management, ENTR 320 Financing New Ventures and FIN430: Options and Futures Markets); three newly developed courses for FinTech concentration (FIN310: Data Driven Financial Modelling, FIN320: Financial Data Analytics, and FIN410: Data Mining and Machine Learning); two newly developed courses (pending approval) for the proposed program (FIN306: Blockchain Technology for Business, MGMT416: AI for Business Decisions); three computer science courses (CS103: Computer Science with Business Problems, CS113: Introduction to Computer Science I, CS114: Introduction to Computer Science II); one course from the Newark College of Engineering (CPT373: Web App Development for Mobile) and a course in research method (MGMT316: Business Research Methods).

In addition to the above areas, all undergraduate degree-seeking NJIT students must satisfy the university's General Education Requirements (GER). The GER is comprised of five thematic areas of knowledge and skills that the university has deemed necessary in order to improve and deepen students' critical thinking beyond the scope of their degree program. The thematic areas and corresponding requisite credit hours are as follows:

- Liberal Arts Literacy (18 credit hours)
- Computational Literacy (3 credit hours)
- Social Science Literacy (3 credit hours)
- Scientific Literacy (7 credit hours)
- Quantitative Reasoning/Mathematics (6 credit hours)

The B.S. in FinTech degree requires a minimum of 120 credit hours. Students may transfer up to 60 credit hours from other programs (see Table 6).

Table 6. Proposed Curriculum of the B.S. in FinTech, 120 Credit Hours

First Year

	1st Semester	Credits
ACCT 115	Fundamentals of Financial Accounting	3
CS 103	Computer Science with Business Problems	3
HUM 101	English Composition: Writing, Speaking, Thinking I *(GER)*	3
MATH 135	Calculus for Business *(GER) (pre-req: Math 107 or Placement exam)*	3
MGMT 190	Introduction to Business	3
	Freshman Seminar	0
	Term Credits	15
	2nd Semester	
CS113	Introduction to Computer Science I *(GER)*	3
MGMT 116	Quantitative Analysis Appl Bus with Lab *(GER)*	4
ECON 266	Macroeconomics	3
HUM 102	English Composition: Writing, Speaking, Thinking II *(GER)*	3
MGMT 290	Business Law I	3
	Term Credits	16

Second Year

	1st Semester	
MIS 245	Introduction to Management Information Systems	3
ECON 265	Microeconomics *(pre-req: Math 135)*	3
MGMT 216	Business Data Analytics *(pre-req: Mgmt 116 or Math 105)*	3
	History and Humanities 200 level *(GER)*	3
	Natural Science *(GER)*	3
	Term Credits	15
	2nd Semester	
FIN 315	Fundamentals of Corporate Finance *(pre-req: Acct 115 or Acct 117, Econ 265 or Econ 201, Mgmt 116 or Math 105)*	3
MRKT 330	Principles of Marketing *(pre-req: Mgmt 190)*	3
OM 375	Management Science *(pre-req: Mgmt 216)*	3
CS 114	Introduction to Computer Science II	3
	Natural Science with Lab *(GER)*	4

	Term Credits	16

Third Year

	1st Semester	
FIN 218	Financial Markets and Institutions *(pre-req: Acct 115, Econ 266, Mgmt 116 or Math 105)*	3
HRM 301	Organizational Behavior *(GER)*	3
FIN310	Data Driven Financial Modelling	3
ENTR 320	Financing New Venture	3
MGMT 399	Career Planning and Major Field Test	1
	Free elective	3
	Term Credits	16
	2nd Semester	
CPT 373	Web App Development For Mobile	3
MIS 385	Database Systems for Managers *(pre-req: CS 103, MIS 245)*	3
FIN320	Financial Data Analytics	3
	History and Humanities 300+ level *(GER)*	3
FIN 306	Blockchain Technology for Business (pending approval)	3
	Term Credits	15

Fourth Year

	1st Semester	
FIN 430	Options and Futures Markets	3
	History and Humanities 300+ level *(GER)*	3
FIN 417	Investments Analysis	3
FIN410	Data Mining and Machine Learning	3
	Free Elective	3
	Term Credits	15
	2nd Semester	
	Free Elective	3
MGMT 480	Managing Technology and Innovation *(pre-req: Junior standing)*	3
MGMT 416	AI for Business (pending approval)	3

Humanities and Social Sciences Senior Seminar *(GER)*	3
Term Credits	12

VIII.References

[1]. Milanovic, Nik (2019). *Fintech's Next Decade Will Look Radically Different.* Retrieved from https://techcrunch.com/2019/12/22/fintechs-next-decade-will-look-radically-different/

[2]. Lyer, Swati. (2018). *The 5 Most In-Demand Skills In The FinTech Industry.* Retrieved from https://www.instarem.com/blog/the-5-most-in-demand-skills-in-the-fintech-industry/

[3]. Chanjaroen, Chanyaporn. (2017). *Pandit Says 30% of Bank Jobs May Disappear in Next Five Yeaers*. Retrieved from https://www.bloomberg.com/news/articles/2017-09-13/ex-citi-ceo-pandit-says-30-of-bank-jobs-at-risk-from-technology

[4]. Sokolin, Lex. (2019). *7,000 Bank Branches Shut Down and 425,00 Jobs Lost* . Retrieved from https://www.linkedin.com/pulse/7000-bank-branches-shut-down-425000-jobs-lost-melting-lex-sokolin/?trackingId=9CLMt6OqTb21KfjJM8vyzQ%3D%3D

[5]. Press release: *EDA Board Action Advances Murphy Administrations' Vision for State's Innovation Economy*. Retrieved from https://www.njeda.com/techboardactionmay2018

[6]. Reiners, Bailey. (2020). *Fintech Recruitment in 2020: What You Need to Know.* Retrieved from https://builtin.com/recruiting/fintech-recruitment

[7]. Heath P. Terry, Debra Schwartz, and Tina Sun, *The Future of Finance: The Socialization of Finance, Part 3*, Goldman Sachs Global Investment Research, 2015, p. 4.

[8]. Governor's office. (2019). *Daily Recap.* Retrieved from https://www.choosenj.com/news/governor-murphy-makes-case-for-new-jerseys-innovation-economy-to-fintech-companies-new-jersey-university-signs-partnership-with-tie-mumbai/