From: Carpenter, TJ
To: Reed, Katie
Cc: Greenbaum, Rob; Tepper, Bennett J.; Chandrasekaran, Aravind
Subject: FW: Fintech Micro-Credential Proposal
Date: Wednesday, May 17, 2023 4:42:07 PM
Attachments: Proposal_Fintech_FCOB.pdf
Makhija_Fintech_May2023.pdf
image002.png
image001.png

Katie,

Please find a 4B certificate attached for CAA review. Maria has reviewed this and expressed no major concerns.

Let us know if you have any questions. Thanks!

THE OHIO STATE UNIVERSITY
GRADUATE SCHOOL

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Graduate School
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Pronouns: He/Him/His

From: Chandrasekaran, Aravind <chandrasekaran.24@osu.edu>
Sent: Monday, May 8, 2023 1:38 PM
To: Miriti, Maria <miriti.1@osu.edu>; Carpenter, TJ <carpenter.1112@osu.edu>
Cc: Greenbaum, Rob <greenbaum.3@osu.edu>; Tepper, Bennett J. <tepper.15@osu.edu>
Subject: Fintech Micro-Credential Proposal

Dear Maria and TJ

The Fisher College of Business would like to submit a proposal for creating a micro-certification in Fintech Fundamentals. This proposal was approved by the Specialized Masters Committee and Non-Degree Executive Education Committee at the Fisher College of Business and presented at the Executive Committee in November 2021. Rob Greenbaum has been of great help giving us feedback on this proposal given the first of its kind. Please find the proposal and the letter from the Dean offering support to the proposal.

Please let me know if you have any questions. I look forward hearing from you.

Regards

AC

THE OHIO STATE UNIVERSITY
FISHER COLLEGE OF BUSINESS

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May 8 2023

Randy Smith
Vice Provost for Academic Programs
The Ohio State University

Dear Randy:

Our Non-Degree Education Committee, Specialized Masters Committee and Associate Dean for Graduate Programs and Executive Education, Aravind Chandrasekaran, has endorsed a proposal for creating a micro-certification in Fintech Fundamentals for the Fisher College of Business.

The proposed curriculum allows our current students as well as prospective students to the Ohio State University gain valuable experience in the area of Fintech Fundamentals. It will also address the upskilling needs for Ohio residents as pointed out in the 2021 Workforce Development Committee Report. Finally, it will also result in more collaborative opportunities to partner with other colleges within the Ohio State to educate our students in cross-disciplinary topics.

Please accept my deepest thanks for considering this proposal and for shepherding it through the levels of review in the OAA and in the Graduate School.

Sincerely,

Anil K Makhija

Anil Makhija
Dean and John W. Berry, Sr. Chair in Business

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TO: Randy Smith, Vice Provost for Academic Programs
Maria Miriti, Associate Dean for Academic Affairs

FROM: Aravind Chandrasekaran, Associate Dean for Graduate Programs & Executive Education, Fisher College of Business

DATE: May 8, 2023

RE: Proposal to create a Micro-Certification in Fintech Fundamentals

The Fisher College of Business respectfully requests approval for a proposal to create a micro-certification in Fintech Fundamentals. This proposal was approved by the Specialized Masters Committee and Non-Degree Executive Education Committee at the Fisher College of Business and presented at the Executive Committee in November 2021.

The documentation accompanying this letter includes:

1. The proposal itself (which has received approval from both the Fisher College's Specialized Program Committee and Non-Degree Executive Education Committee)
2. A letter supporting the proposal from Dean Anil Makhija

Many thanks in advance for helping us move forward with the plan for creating a new micro-certification in Fintech Fundamentals.

Sincerely,

Aravind Chandrasekaran, PhD
Associate Dean for Graduate Programs and Executive Education
Fisher Distinguished Professor of Operations
Fisher College of Business
The Ohio State University
Columbus OH 43210

A Proposal to Create a Micro-Certification in FinTech Fundamentals

Submitted by the Fisher College of Business
The Ohio State University

Introduction. The Fisher College of Business proposes a micro-certification in FinTech (short for Financial Technology) Fundamentals that will launch in Spring 2024. The micro-certification will consist of 4.5 credit hours and will provide introductory-level knowledge pertaining to the emerging technologies that organizations use to improve and automate the delivery of financial services. Those technologies include artificial intelligence, machine learning, and blockchain. The financial services include mobile wallets and payment apps (e.g., PayPal, Venmo, Apple Pay), crowdfunding platforms (e.g., Go Fund Me, Kickstarter), cryptocurrency exchanges (e.g., Coinbase, Gemini), stock trading apps (e.g., Robinhood, Acorns), robo-advisors (e.g., Betterment, WealthSimple), mortgage services (e.g., Lower.com, Better.com), insurance services (e.g., Root, Battleface), and credit monitoring apps (e.g., Credit Karma). The increasing frequency with which consumers are relying on FinTech to access basic financial services (e.g., money transfers and payments, savings and investments, budgeting and financial planning, & borrowing)[1] has made a fundamental knowledge of FinTech desirable for a variety of occupations, job titles, and industry sectors (see Table 1).

Table 1
Illustrative Occupations and Job Titles that can require FinTech Knowledge and Competencies

Software developer	Customer service representative	Market research analyst	Software engineer
Software quality assurance analyst	Financial and investment analyst	Implementation consultant	IT business consultant
Management analyst	Financial risk specialist	Implementation analyst	Business system analyst
Financial manager	Information security analyst	Conversion analyst	Claims adjuster, examiner, and investigator
Securities, commodities, and financial services sales agent	Computer and information system manager	Sales director	Compliance officer
Logistician	Compensation, benefits, and job analysis specialist	Project management specialist	Budget analyst

[1]Global FinTech adoption index 2019. EY Global Financial Services.

Credit analyst	Personal financial advisor	Insurance underwriter	Loan officer
Computer systems analyst	Computer network architect	Data base administrator	Computer programmer
Web developer	Operations research analyst	Statistician	Engineering technologist
Senior corporate counsel, General counsel, VP of legal	CFIUS compliance		

The FinTech Fundamentals micro-certificate will consist of two required courses (4.5 credit hours), all of which are currently offered in the MBA Program. Short-form syllabi for the FinTech Fundamentals courses are presented in Appendix A. The courses will be delivered in both in-person and on-line modalities and, ordinarily, students will complete the program in one semester with the two courses being taken simultaneously. The current plan is to have these courses offered in the spring term.

Required Courses for the FinTech Fundamentals micro-certification

- BUSFIN 7234: FinTech (1.5)
- BUSOBA 7247: AI and Machine Learning for Business (3.0)

Rationale for a Micro-Certification in FinTech Fundamentals. Creating a FinTech Fundamentals micro-certification is consistent with The Ohio State University's effort to meet workforce development needs by expanding the categories of programmatic offerings. As explained in a 2021 Workforce Development Committee report entitled, *Categories and Descriptions of Credit-Based and Non-Credit-Based Education and Training for Workforce Development and Credentialing*, "Ohio employers are pressured to obtain a skilled workforce that cannot be met via current degree capacities and trajectories. Recently, the State of Ohio has established TechCred[2] initiative that allows organizations within Ohio to receive training dollars for their employees seeking upskilling opportunities through shorter training programs in the area of technology. " Micro-certifications are shorter programs of study (≥ .5 credit hours to < 12 credit hours), the completion of which earn students a digital badge that confirms mastery of focused content matter and of in-demand competencies. Post-baccalaureate micro-certifications are appealing to individuals at various career stages including those who (a) want to "keep up" by adding skills while staying in their current job, (b) are contemplating a return to the workforce after an absence, (c) are planning to make a career switch, (d) are preparing for promotion, or (e) are simply pursuing a passion. For individuals in all these categories, micro-certificate programs allow one to update or advance their skill-set in an affordable and timely manner (compared to the more extensive amount of training and personal investment that goes into certificate and Master's programs).

[2] https://techcred.ohio.gov/

Micro-certificate programs can operate in a stand-alone fashion, as feeders to certificate or full-blown Master programs, and/or as specializations within generalist Master programs (akin to majors or pathways).[3] Some institutions offer students opportunities to "stack" micro-certificates by completing multiple such programs in serial fashion.[4]

There is compelling evidence that on the employer side, micro-credentialing, as a form of skill development is gaining acceptance. When in 2019 six hundred human resource management professionals were asked if they would consider digital badges as an alternative to a formal degree, 20% said they would; by 2021, that percentage had grown to 54%.[5]

Colleges of Business in the U.S. began offering micro-certifications/digital badges in 2016. Early movers included the Kelly School of Business at Indiana University and the McCombs School of Business at the University of Texas.[6] Since that time, such offerings have become common at major business schools. The University of Pittsburgh's Katz School of Business now offers micro-certifications in Accounting, Corporate Finance, Data Programming for Business Insights, Digital Innovation, Innovation and Entrepreneurship, Leading People in Organizations, and Management Consulting. Harvard offers a suite of micro-certificates that serve as stand-alone programs for post-baccalaureate working professionals and as feeders for its regular Masters programs. The University of Wisconsin's recently launched Professional MBA program requires students to complete a core curriculum and four 6-credit hour badges (out of eight from which students may choose).

There are many more examples that could be highlighted here. The important takeaway is that peer and aspirant institutions of the Fisher College have already responded to the demand for micro-certifications that address the workforce development needs of local communities and beyond.

It is for these reasons that developing micro-certifications was made a featured strategic initiative in the Fisher College's Strategic Plan 2021-2026. The Fisher College is now considering several micro-certification content areas but it has decided to propose FinTech Fundamentals first. Why FinTech? Although there is at this time no university in Ohio that offers a short program of study in FinTech, the state ranks 7th in terms of the total number of financial service jobs. Moreover, by GDP, FinTech constitutes the second largest industry sector in Ohio. An EAB study using the EMSI database confirms the value to job seekers of having a working knowledge of FinTech. For the time frame spanning January 2020 to February 2021 using the keyword FinTech uncovered 5,598 job postings in Ohio (between 400 and 500 per month). These numbers are consistent with reports on job postings in other geographical regions.

[3]Marcus, J. (2020). More students are "stacking" credentials en route to a degree. *Wired*, June.
[4]Brown, A. (2016). A new way to cut the cost of college: Stackable credentials. *Forbes*, October.
[5]Lazarewicz, K. (2021). Micro-credentials: The new enrollment funnel for tomorrow's universities. Wiley Education Services.
[6]Damast, A. (2016). Digital badges make a B-School debut. *Poets & Quants*, January.

For the metropolitan area encompassing Philadelphia, Camden, Delaware, and Maryland, the number of FinTech job postings per month increased from 125 in December 2017 to 533 in November 2020. In Fall 2022, the Fisher College of Business in collaboration with the University Office of Corporate engagement conducted the first annual Fintech Summit that drew employees from various local organizations. There was overwhelming excitement on the possibility of offering micro credentials in this area.

Colleges of Business outside Ohio are offering academic programming that is designed to meet this demand. Table 2 shows that these programs vary in terms of length/depth of coverage and in terms of cost. Excluding the University of Boston's residential certificate program, the kinds of FinTech programs that are offered generally fall into two buckets: programs that are organized around a 1-credit to 3-credit course equivalent and that are intended to be completed in six weeks or less (e.g., Harvard, Stanford, Wharton, Berkeley, Cornell) and programs that consist of three to four 3-credit course equivalents and that are intended to be completed over two semesters (e.g., Northwestern, Rutgers, & Minnesota). With respect to program length and cost per credit, the Fisher College FinTech Fundamentals program will align more closely with the second model.

Table 2
FinTech Workshops, Bootcamps, Certificates, and Micro-Certificates
Offered by Fisher College Peer and Aspirant Institutions

College of Business	Tuition	Program Length
Boston University – Questrom (in-person)	$39,644	1 academic year
Northwestern University (on-line)	$12,495	3 months or 6 months
Rutgers (on-line)	$12,495	6 months
University of Minnesota (on-line)	$11,000	6 months
Ohio State – Fisher (in-person & on-line)	**$7,560**[7]	**14 weeks**
Harvard (on-line)	$3,600	6 weeks
UT Austin – McCombs (on-line)	$3,100	4 months
Stanford (on-line)	$2,900	4 days
University of Pennsylvania – Wharton (on-line)	$2,600	6 weeks

[7]The courses comprising FinTech Fundamentals are currently taught in the Fisher College's SMB Finance and WP MBA. The tuition reflects the extant per credit rate for the two courses (~ 1,700).

Berkeley (on-line)	$2,600	3 days
Cornell (on-line)	$2,520	2 weeks

A FinTech Fundamentals micro-certificate program will appeal to:

- Individuals who are interested in the micro-credential as a stand-alone credit-bearing program or as an introductory offering upon which other micro-certificates may be stacked on the way to pursuing a certificate or a Masters' degree. For some members of this group, who may reside outside Ohio, an online FinTech micro-certificate program will be particularly appealing.
- Individuals enrolled in in-person and online graduate programs outside the Fisher College (e.g., Engineering, Law, Public Policy, Actuarial Sciences, and Statistics). The FinTech curriculum delivered in-person and online will appeal to this group.
- Individuals enrolled in Fisher College graduate programs (e.g., Full-Time MBA, Working Professional MBA, Specialized Master in Finance, & Specialized Master in Business Analytics). This group will also be interested in taking the FinTech micro-certificate in an in-person or in an online format.

Career Outcomes for Students. To get a sense of the career outcomes for those who complete the micro-credential, the Fisher College's Office of Career Management reached out to a sample of prospective employers in industries ranging from financial services, consumer goods to health care to professional services/data analytics to insurance. The consensus view among these informants was that completing a FinTech micro-credential would be differentiator for our students seeking career opportunities in the region. There was a consensus opinion that those who complete the micro-credential (either as part of a larger program of study or as a stand-alone program) would be positioned to pivot to new roles that come with greater challenge and responsibility and to win more and varied job offers. The recurring theme among these informants was that the FinTech micro-credential affords learners skill development that will have an immediate impact on their marketability and opportunity and a long-term, indirect impact on salary. When asked to estimate the downstream impact on salary, our informants reported that it would be between $10k to $20k per year when the micro-certificate is combined with a master's degree (i.e., MBA or Master of Business Analytics) and between $5k to $10k per year when the certificate is completed on a stand-alone basis.

Curriculum. The FinTech Fundamentals micro-certificate curriculum is designed around the fundamental skills and competencies that employers report that they are looking for in new hires.[8] Table 3 lists these competencies and reports how they are covered across the three courses comprising the micro-certification.

[8]The FinTech industry is dynamic, characterized by frequent changes in the core technologies upon which FinTech applications are built and in terms of the applications themselves. Faculty responsible for teaching FinTech courses must therefore update their content on an ongoing basis.

Assessment Plan: The Fisher College of Business will continuously assess student learning in the FinTech Fundamentals courses and in the program overall. Curriculum mapping ensures that expected learning outcomes (ELO's) are reflected in a program's curriculum so that each goal is taught and assessed. The curriculum map in Table 3 shows the relationships between the program's courses and learning. The Fisher College will assess, and compare year-to-year, the proportion of students that meet and exceed expectations on these competencies.

Table 3
Fundamental Fin-Tech Expected Learning Outcomes and Assessment

General Topics	FIN 7234 Expected Learning Outcomes	OBA 7247 Expected Learning Outcomes	FIN 7234 Assessment	OBA 7247 Assessment
FinTech Industry	• Understand history of technology in finance • Understand new trends, needed skills, and forces behind the growth of the FinTech industry	• Understand current uses of AI/ML in the FinTech industry • Understand developments and trends in AI/ML and evaluate potential opportunities in FinTech	• Case studies on global trends in FinTech • Class assignment on the case study and other reading material • Evaluating Student Knowledge on the Industry Structure through Exams	• Class project using real-world data on developing, prototyping, and deploying an ML-based FinTech product
Blockchain Theory	• Understand the theory of blockchain • Understand the mechanics of Bitcoin and how it works		• Case study and homework on blockchain technology • Theoretical Assessment of Student knowledge on the foundations of Block Chain	
Blockchain Applications	Apply blockchain technology, including: • Cryptocurrencies	Apply machine learning models in	• Business Challenge Pitching on	• Class project using real-world data on developing,

	• Decentralized Finance (DeFi) • NFTs	blockchain contexts, including: • Forecasting price and volume of blockchain assets • Trading automation • Anomaly detection for security •	Blockchain Application • Group research and in-class presentation on blockchain applications •	prototyping, and deploying an ML-based FinTech product, which may involve blockchain technology
Artificial Intelligence (AI) Theory	• Understand machine learning (ML) and data science in finance • Understand different types of ML models	• Understand the theory, landscape, and future directions of AI and ML • Understand ML methods for three common types of learning: supervised, unsupervised, and reinforcement • Recognize opportunities for creating business value with artificial intelligence	• Case study and homework on Application of ML in finance •	• Individual exercises, problem sets, and case studies • Exam
AI Applications	• Apply ML in finance including credit modeling, investment, insurance, etc. • Use actual data to build ML models using the Orange data mining software	• Apply core machine-learning methods for supervised, unsupervised, and reinforcement learning to practical business problems • Use Python to implement and deploy ML models • Use Python to Analyze complex data	• Class project on creating a ML credit model using Orange data mining software • Exam	• Class project using real-world data on developing, prototyping, and deploying an ML-based FinTech product • In-class presentations communicating performance and value of ML-based FinTech product • Hackathon competition on AI uses

In addition, the Fisher College conducts indirect assessments of its' programs' effectiveness. This includes systematically tracking the raw count, quality (i.e., GMAT, GPA, leadership potential), and diversity (% women and under-represented minority) of its applicant, admissions, and matriculation pools. It also includes ongoing assessment of student satisfaction with coursework (i.e., SEI's) and with their program overall (during the program, upon graduation, and well after graduation).

Specifics Pertaining to Mode of Delivery. The program will be offered in both in-person and online formats. For the online offering, the Fisher College aims for a breakdown of 50% synchronous and 50% asynchronous in each class for the program. Students will also have access to the instructors through office hours and outside the classroom contact hours when needed. With this instructional mix, the college is able to give adult learners some flexibility to fit the program around their work schedule while also offering opportunities to collaborate and network with other students and with faculty in real time.

Program Administration. Responsibility for administration and/or oversight of the FinTech Fundamentals micro-certification will reside with a Dean-appointed academic director (AD) who will, in turn, work closely with:

- an advisory board consisting of the Fisher College's Associate Dean for Graduate Programs and Executive Education and the respective chairs of the Departments of Finance and of Operations and Business Analytics.
- the Fisher College Graduate Program Office (GPO) on matters related to recruiting, admissions, advising, and correspondence with current students and alumni
- the Fisher College Office of Career Management (OCM) on placement issues
- the Ohio State Office of Distance Education and E-learning (ODEE) and the Fisher College's Office of Information Technology Services, which have critical roles to play in adapting the program content to an online format

Plans to Enroll Students and Prospective Enrollment. The FinTech Fundamentals micro-certification is designed for post-baccalaureate students who may have no formal business training. Students already enrolled in Ohio State graduate programs, business or non-business, who have a cumulative GPA of 3.0 or better may pursue the micro-certificate using the elective hours that their degree program requires.

For applicants not already enrolled in a graduate program the minimum requirements will be an undergraduate 4-year degree from an accredited university, undergraduate GPA of 3.0, and relevant work experience.

For all applicants, prior to pursuing the micro-certificate, it is preferred but not required that they have completed an introduction to finance course that is equivalent to FIN 3220/FIN 3120 (i.e., the core finance course that undergraduate business majors/minors must complete). The Fisher College of Business will offer additional asynchronous content for the students who do not have the necessary financial acumen. The college already has content developed that can be made available for eligible students.

The college will partner with centers of excellence such as the Risk Institute, Nationwide Data Analytics Institute to promote this certificate offering to a diverse group of student population. We will plan on contacting organizations such as National Action Council for Minorities in Engineering (NACME), Blacks in Technology that have OSU Alumni to inform on the certificate opportunity for upskilling.

The job market data reviewed earlier gives us reason to expect good demand for a stand-alone micro-certificate in FinTech Fundamentals. Preliminary revenue estimates have been prepared that reflect prospective enrollment in FinTech Fundamentals as a stand-alone online program, independent of existing degree programs. See Table 5. These estimates reflect realistic enrollment goals: 30 students in year 1, 40 students in year 2, and 50 students in subsequent years. The model assumes that students complete the program in one semester. We anticipate that these estimates will change as we learn more about the costs associated with operating micro-certification programs (e.g., digital badging, recruiting budgets, program administration, and so on).

Table 5
Financial Model for FinTech Fundamentals Micro-certification Program

DRAFT - FCOB FinTech Micro-Certificate

Program Revenue Information	***INPUT***	***INPUT***	***INPUT***	***Year 1***	***Year 2***	***Year 3***	***Comments***
Program instructional fee per semester	$7,560	$7,560	$7,560	$7,560	$7,560	$7,560	Per 8 credits or higher; WPMBA Rate
Base instructional fee per semester				$5,780	$5,780	$5,780	0% increase per year
# of new students	30	40	50	30	40	50	Based on proposal projections
# of semesters per new student				1	1	1	
# of credit hours per semester per new student				4.5	4.5	4.5	
State subsidy revenue rate per credit hour				$387	$387	$387	0% increase per year
University central tax rate				24%	24%	24%	
Distance Learning (Y/N)	Y	Y	Y	Y	Y	Y	
Nonresident surcharge per semester				12,976	12,976	12,976	
Technology fees per semester				$261	$261	$261	
Distance Learning NR surcharge				$200	$200	$200	
Program Revenue Calculation							
Base instructional fee revenue				$97,538	$130,050	$162,563	
Subsidy revenue					60,961	78,378	
Distance learning non-resident surcharge	50%	50%	50%	$3,000	$4,000	$5,000	assumption 50% is non-resident
Support units tax (24%)				(24,129)	(46,803)	(59,026)	
Distance Education share (30%)				($22,923)	($44,462)	($56,074)	
Differential instructional fee revenue				$30,038	$40,050	$50,063	
Projected Revenue				**$83,523**	**$143,796**	**$180,903**	
Program Cost Calculation							
Instructional costs	$6,667	$6,667	$6,667	$30,002	$30,002	$30,002	$6667 per credit hour (with benefits)
Program Director				4,636	4,636	4,636	Based on camparison to paying $8K to faculty director of JPMC Full Cert Program
Student Aid				0	0	0	No aid
Other costs (cost of various offices or advertising, etc.)				34,050	35,550	37,050	Assume 10% of Standard Support Services and 10% of Standard Advertising costs
Projected Cost				**$68,688**	**$70,188**	**$71,688**	
Projected Revenue less Cost				**$14,836**	**$73,608**	**$109,215**	
Other Cost Assumptions	Standard Rate for full Masters Program			Mini-Cert Rate			
GPO and Career Services Support	$295,500 per program			29,550			
Advertising	$1500 per student			150			

Fit With Other Post-Baccalaureate Programming. Deploying a micro-certification in FinTech is part of larger effort to address the need for workforce development with respect to emerging industries. The Fisher College is therefore working with other academic units to develop programming that would build on the FinTech Fundamentals micro-certificate. This includes additional micro-certificates that may be stacked on Fin-Tech Fundamentals and that could lead to the awarding of a certificate or Masters degree. Partners in developing stackable programming related to FinTech include the College of Arts and Science, the College of Engineering, the Moritz College of Law, and the John Glenn College. See below some examples of how programming coming from different colleges might cohere around the larger theme of FinTech and provide the basis for a collection of stackable micro-credentials. Please note that the courses listed here and how they are bucketed are meant to be illustrative. The participating colleges and schools will work together to arrive at an overall program architecture.

FinTech: Mathematical, Statistical, and Analytical Foundations

- MATH 5632: Financial Economics for Actuaries (3.0)
- MATH 6601: Numerical Methods in Scientific Computing (4.0)
- STAT 6500: Statistical Machine Learning (3.0)
- STAT 7730: Advanced Computational Statistics (3.0)
- OBA 6273: Data Analysis for Managers (3.0)
- OBA 7332: Predictive Analytics (3.0)
- OBA 7256: Data Tools (1.5)
- OBA 7222: Simulation Risk Analysis and Decision Making (1.5)

FinTech: Engineering, Technology, and Design

- CSE 6341: Foundations of Programming Languages (3.0)
- CSE 5523: Machine Learning and Statistical Pattern Recognition or CSE 6331 Algorithms (3.0)
- ISE 5700: Cognitive Systems Engineering (3.0)
- ISE 6300: Simulation for System Analytics and Decision Making (3.0)
- ECE 5307: Introduction to Machine Learning for ECE (3.0)
- ECE 5759: Optimization for Static and Dynamic Systems (3.0)
- ISE 5682: Fundamentals of Product Design Engineering (3.0)
- ISE 5740: Cognitive Engineering Systems: Human Centered Automation (3.0)

FinTech: Legal, Ethical, and Policy Issues

- LAW 7804: The Law of Cyberspace (3.0)
- LAW 7806: Privacy (3.0)
- ECE 5561: Introduction to Cybsersecurity (3.0)
- ECE 5567.01: Offensive Security (3.0)
- PUBAFRS 7504: Science and Technology Policy (3.0)
- LAW 7815: Introduction to Intellectual Policy (3.0)
- LAW 7212: Banking Law (3.0)

FinTech: Business Applications

- BUSFIN 7215: Entrepreneurial Finance (1.5)
- BUSFIN 7220: Investments (1.5)
- BUSFIN 7223: Portfolio Management (1.5)
- BUSFIN 7226: Behavioral Finance (1.5)
- BUSFIN 7260: Financial Institutions (1.5)
- BUSMHR 7461: Technology and Innovation Strategy (1.5)
- BUSMHR 7530: Developing High Performance Teams (1.5)
- BUSMHR 7235: Diversity, Equity, and Inclusion (1.5)
- BUSMKTG 7208: Advertising, Promotion, and Digital Marketing (1.5)
- BUSMKTG 7207: Pricing Strategy (1.5)
- BUSML 7202: Consumer Behavior (3.0)

- BUSOBA 7269: Change and Innovation (3.0)

Appendix A
Short-Form Syllabi for FinTech Foundations Micro-Certification Courses

Course Title: AI and Machine Learning for Business

Course Number: BUSOBA 7247

Credits: 3

Prerequisites: MBA 6273

Course Description: The application of modern algorithms to large quantities of data is transforming all business disciplines, creating numerous opportunities for new business models and new ways to compete. The purpose of this course is to provide an introduction to artificial intelligence and machine learning techniques alongside example applications. We will implement these techniques in Python using a variety of data sources and types. The course will cover supervised and unsupervised learning approaches.

Course Objectives: After completing the course, participants will be able to recognize opportunities for creating vale with artificial intelligence and machine learning.

Content Topic List:
Working in Python
Classification and nearest neighbors
Linear regression and model fitting
Regularization and logistic regression
Support vector machines
Decision trees
Ensemble methods
Dimensionality reduction
Neural networks (perceptrons, backpropogation, fitting, fine tuning)
Unsupervised learning and clustering

Course Title: FinTech

Course Number: BUSFIN 7234

Credits: 1.5

Prerequisites: MBA 6223 or enrollment in SMB Finance Program

Course Description: The course provides an overview of the most recent technological advances that are radically changing the financial services industry. Technological breakthroughs offer new ways for people to save, invest, borrow, and transact. We will analyze how new technologies create value in the financial industry, from reducing unit cost, increasing transparency, increasing competition, creating network effects, leveraging economies of scale, and lowering asymmetric information. We will also study the competitive landscape and the market opportunities and threats for incumbents and new entrants.

Course Objectives: Students will understand the FinTech industry, distributed ledgers, blockchains, initial coin offerings, and cryptocurrencies, and how artificial intelligence and machine learning are used in FinTech applications.

Content Topic List:
FinTech overview
Cryptography and encryption algorithms
Distributed ledgers and blockchain
Cryptocurrencies and blockchain applications
ICOs and financing blockchain ventures
Trading environment, data, and blockchain analytics
Machine learning and applications in finance
Machine learning and marketplace lending
Robo-advising
Algorithmic trading
Payment systems, insurance