Faculty Senate Office
Ashe Administration Building, #325
1252 Memorial Drive
Coral Gables, FL 33146

facsen@miami.edu
web site: www.miami.edu/fs
P: 305-284-3721
F: 305-284-5515

MEMORANDUM
*Revised

To: Julio Frenk, President

From: Tomás A. Salerno
Chair, Faculty Senate

Date: April 9, 2019

Subject: * Faculty Senate Legislation #2018-51(B) – Creation of a Financial Technology Minor, Business School

****

The Faculty Senate, at its March 27, 2019 meeting, had no objections to the proposal from the Business School for the creation of a Financial Technology Minor.

The minor will require successful completion of 12 credit hours. Three new courses will be created to support the program. The minor will also require two prerequisite courses, as noted in the enclosed proposal.

The Faculty Senate does not approve budget concepts, therefore no budget information is included here.
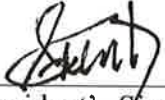
This legislation is now forwarded to you for your action.

TAS/rh

Enclosure

cc: Jeffrey Duerk, Provost and Executive Vice President for Academic Affairs
John Quelch, Dean, Business School
Alfred Mettler, Associate Professor of Professional Practice, Business School

CAPSULE: * Legislation #2018-51(B) – Creation of a Financial Technology Minor, Business School

APPROVED: _____ DATE: 4/24/19
(President's Signature)

OFFICE OR INDIVIDUAL TO IMPLEMENT: Dean John Quelch

EFFECTIVE DATE OF LEGISLATION: _____IMMEDIATELY_____
(pending any additional approval by the Board of Trustees)

NOT APPROVED AND REFERRED TO: _____

REMARKS (IF NOT APPROVED): _____

UNIVERSITY OF MIAMI

Proposal Submission Checklist

Proposals are to be submitted to the Office of Assessment and Accreditation (OAA), if applicable, the Graduate Council (for graduate programs excluding Law and Medical), if applicable, and the Faculty Senate. Refer to the Procedures for Program Changes document for information on the approvals and notifications needed for program changes and the Proposal Submissions Specifications document for an explanation of the process and a list of the materials required.

(Please note that change approvals can take 2 semesters to complete.)

FORM INSTRUCTIONS:
1. Save/download the form as a pdf.
2. After completing the information below, print and scan the form.
3. Insert it with the background materials that are specified, in the order listed, and submit to facsen@miami.edu.
Please note: *only scanned versions can be accepted.*

Include this checklist at the beginning of each proposal.

KEY CONTACT PERSONNEL INFORMATION

First Name
Alfred

Last Name
Mettler

Proponent's Title
Associate Professor of Professional Practice, Finance

Department, if applicable
FIN and BTE

School/College
MBS

E-mail
amettler@bus.miami.edu

Phone
305-284-9394

Title of Proposal
Proposal to create a Fintech Minor

(-continue to next page-)

MANDATORY MEMORANDA AND FORMAT

Please check that each item listed below is included in the proposal package of materials, in the ORDER as listed. The applicable title (i.e. Letter of Explanation, Memo from the Dean, etc.) is to precede each section in the materials.

Only proposals conforming to this format will be accepted.

1. This completed checklist.

---

2. Letter of explanation. (2-3 pages only, double spaced, 12 pt font)

⦿ Yes   ◯ No

If no, explain why:

3. A memo from the dean(s) signifying approval of the faculty of the relevant School(s) / Colleges(s).

⦿ Yes   ◯ No

If no, explain why:

4. A memo that all affected or relevant School / College Council(s) have approved.

◯ Yes   ⦿ No

If no, explain why:

The minor does not affect other Schools/Colleges

5. A memo from the department chair(s) signifying approval of the faculty of the relevant department(s).

⦿ Yes   ◯ No

If no, explain why:

---

6.   A memo from the Office of Accreditation and Assessment (OAA) if the proposal involves academic programs (degrees, certificates, majors, minors, concentrations, specializations, tracks, etc.) such as new programs, closing programs, or program changes (such as changes in requirements, program length, modality, name, location).

(To be submitted by OAA to the Graduate Council or the Faculty Senate, as appropriate.)

⦿ Applicable   ◯ Not applicable.

If not, explain why:

---

7.   A memo from the Graduate School Dean signifying approval of the Graduate Council (for graduate programs only).
(To be submitted to the Faculty Senate by the Graduate Council.)

◯ Applicable   ⦿ Not applicable.

If not, explain why:

The minor is for undergraduates

8. Academic Deans Policy Council (ADPC) approval, for interdisciplinary issues and as appropriate. Please consult with the <u>Dean of the Graduate School</u> or the <u>Secretary of the Faculty Senate</u> to check if this is needed.

○ Yes   ◉ No

If no, explain why:

Not interdisciplinary

---

9. Additional required documents as listed on the "<u>Proposal Submissions Specifications</u>," i.e. market analysis, budget information, assessment of library collections, etc. as specified.

List additional documents included:

Market analysis is discussed in the explanatory letter

End form.

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BUSINESS SCHOOL

Memorandum

To: **Faculty Senate**

From: **Alfred Mettler, MBS, Department of Finance**

Re: **Proposal for a Financial Technology (Fintech) Minor**

Date: **January 31, 2019**

This memorandum is intended to summarize the proposal to create a Financial Technology (Fintech) minor and get approval from the Faculty Senate. The proposal has been unanimously approved by the Finance department on Nov 12, 2018, by the Business Technology department on Nov 14, 2018, by UBEC on Dec 5, 2018, and by School Council on Jan 18, 2019.

What is Fintech? (source: www.investopedia.com)

… "Fintech, a portmanteau of 'financial technology,' is used describe new tech that seeks to improve and automate the delivery and use of financial services. At its core, fintech is utilized to help companies, business owners and consumers better manage their financial operations, processes and lives by utilizing specialized software and algorithms that are used on computers and, increasingly, smartphones. When fintech emerged in the 21st Century, the term was initially applied to technology employed at the back-end systems of established financial institutions. Since then, however, there has been a shift to more consumer-oriented services and therefore a more consumer-oriented definition. Fintech has expanded to include any technological innovation in — and automation of — the financial sector, including advances in financial literacy, advice and education, as well as streamlining of wealth management, lending and borrowing, retail banking, fundraising, money transfers/payments, investment management and more. Fintech also includes the development and use of crypto-currencies such as bitcoin. That segment of fintech may see the most headlines, the big money still lies in the traditional global banking industry and its $8 trillion market capitalization." …

Purpose and goals of a Fintech minor

Fintech, the emerging world of applications, concepts, developments, business models, and companies at the interface of Finance and Technology, is one of the hottest topics in Business. Financial institutions and startups fight for various pieces of the value chain for financial products and services, and the sector has attracted massive amounts of capital investments over the last years (see for example "The Pulse of Fintech", KMPG biannual global analysis of investment in fintech, July 2018).

The proposed Fintech minor combines classes in Finance and Technology and prepares students for careers in the broader Fintech industry. Graduates who understand the fundamental aspects of Fintech are in high demand, and MBS will be at the forefront of higher education in this area.

Architecture of the program

Attached to this proposal are an overview of the Fintech minor, the proposed language for the academic bulletin, and the course descriptions.

In essence, the Fintech minor combines one existing course (FIN 410 – Financial Institutions) with three new courses (FIN 418 – Fundamentals of Fintech, BTE 420 – Python Programming for Fintech, BTE 422 – Technology Foundations of Fintech). Each of these courses will (1) cover a specific part of the Fintech landscape, and (2) build bridges to the other courses. Students are free to pick and choose the courses in the sequence they want. After having taken the required four courses they will not only understand the fundamental aspects of Fintech companies, but also how the individual components (from programming to financial value chains) fit together.

The target audience are students who major in Finance, Business Technology, or in another area offered by UM, and want to gain a deeper understanding of the Fintech industry.

Program oversight and implications for budget and class schedule

The program is overseen by the two department chairs, Dr. Alok Kumar, chair FIN department, and Dr. Robert Plant, chair BTE department.

There will be no direct implications for budget and class schedules. Each of the BTE/FIN courses required in the new minor will be available as an elective in the BTE/FIN department, such that in addition to students pursuing the new minor, students in the existing BTE/FIN majors will be able to utilize these electives to complete the BTE/FIN major. Given the architecture of these majors, no student will be prejudiced or prevented from completing their major with the addition of the 3 new electives.

The budget and teaching load effect is neutral, because these courses become three new courses in existing suites of many rotating electives in the BTE/FIN department that are offered and from which students choose to complete their BTE/FIN major. However, with the advent of the new minor, BTE/FIN departments do commit to offering each of the four courses in the minor at least once per year to facilitate completion of the new minor.

Demand for Graduates / Market Analysis

Students graduating with competences in Technology/Programming, Finance, and Fintech are in high demand. We envision that the Fintech minor will be very popular, and students will easily find jobs after graduation.

Most Universities offer courses in Technology, Programming and Finance, but only relatively few have created integrated Fintech programs which combine the different elements. **By creating a Fintech minor UM would definitely be among the leaders in this area**.

Following are examples of peer institutions with Fintech programs:

-   NYU: Various Fintech programs, see: http://www.stern.nyu.edu/experience-stern/about/departments-centers-initiatives/interdisciplinary-initiatives/financial-technology-fintech/fintech-academic-programs
-   Lehigh: Fintech minor, see https://cbe.lehigh.edu/academics/undergraduate/fintech-minor
-   Fordham: Concentration in Fintech, see https://www.fordham.edu/info/24491/undergraduate_business_majors_concentrations_and_minors/9992/fintech/1

Creation of a Fintech Minor

Documents following:

- Overview
- Academic bulletin
- Course descriptions
- Memo from OAA
- Memo from Dean Quelch, Miami Business School
- Memo from Alok Kumar, Chair Department of Finance
- Memo from Robert Plant, Chair Business Technology Department
- New course request form FIN 418
- New course request form BTE 420
- New course request form BTE 422
- Syllabus FIN 418
- Syllabus BTE 420
- Syllabus BTE 422
- Syllabus FIN 410

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Financial Technology (Fintech) Minor – Course Overview

Prerequisites:

FIN 302: Fundamentals of Finance

FIN 320: Investments and Security Markets

Courses required for Fintech minor:

FIN 410: Financial Institutions and Markets

FIN 418: Fundamentals of Fintech

BTE 422: Technology Foundations of Fintech

BTE 420: Python Programming for Fintech

Recommendations for further courses:

FIN 405: Financial Modeling

FIN 415: Trading and Markets

FIN 423: Introduction to Alternative Investments

Entrepreneurship courses

BTE Courses

Financial Technology Minor

Proposed text for academic bulletin

Minor Area of Specialization in Financial Technology (Fintech) (STEM)

Miami Business School students may pursue a minor in Fintech by officially declaring the minor. At this point the minor is available only to UM business students.

The 12-credit-hour minor in Fintech consists of the following (all courses must be taken within the current pre-requisite structure):

Code	Title	Credit Hours
Prerequisite Courses		
FIN 302	Fundamentals of Finance	3
FIN 320	Investments and Security Markets[1]	3
Required Courses		
FIN 410	Financial Institutions and Markets[2]	3
FIN 418	Fundamentals of Fintech[3]	3
BTE 422	Technology Foundations of Fintech	3
BTE 420	Python Programming for Fintech	3
Total Credit Hours		**12**

[1] Pre-requisite is FIN 302

[2] Prerequisites are FIN 302 and FIN 320

[3] Prerequisites are FIN 302 and FIN 303 or FIN 320

* **NOTE:** All specific coursework for the minor in Fintech must be completed with a grade of "C-" or higher. A minimum cumulative GPA of 2.5 is required for all specific coursework taken in the minor area of specialization.

Fintech Minor - Course Descriptions

FIN 410: Financial Institutions and Markets

This course examines financial institutions, such as banks (commercial, investment, mortgage, savings), credit unions, insurance companies, pension funds, and mutual funds and the money markets in which they operate, and focuses on why they exist and how to manage them. Topics include financial intermediation and transmutation, monetary theory and policy, Federal Reserve management of the money supply, velocity of money, fiscal theory and policy, interest rates, and immunization.

FIN 418: Fundamentals of Fintech

This course introduces students to Fintech, the emerging world of applications, concepts, developments, business models, and companies at the interface of Finance and Technology. The course format is a mixture of introductory topical lectures, class discussions, and interactive seminar-style student presentations. It covers the main Fintech areas like Peer-to-Peer-Lending, Crowdfunding, Mobile Payment Systems, Cryptocurrencies and ICOs, Robo Advising, Insurtech (insurance technology), and RegTech (regulatory technology). A special emphasis is given to how and by whom these emerging technologies are currently used, and how they may potentially change the landscape of finance and financial services in the future.

BTE 420: Python Programming for Fintech

The course covers the fundamentals of object-oriented programming, logic and structured programming principles including problem solving, algorithm design, and program development using Python with focus on financial programming applications. Topics covered include fundamentals of algorithms, flowcharts, problem-solving, programming concepts and methodologies, control structures, arrays, and strings, classes and class-methods, data structures and object oriented programming concepts including classes, methods, inheritance and polymorphism.

BTE 422: Technology Foundations of Fintech

The course covers multiple disciplines of technology and how they are individually and collectively applied in financial systems, transactions, payments, and data lifecycles. The course aims to develop a student's understanding of key technological components such as cloud computing, Internet of Things(IoT), Big Data and Machine Learning, Artificial Intelligence, Blockchain technologies, data security, privacy and technology regulations as they relate to financial transactions, financial institutions, public and private business entities, governments, regulations and an overall monetary system.

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OF MIAMI

Assessment and Accreditation
Gables One Tower 1320 S. Dixie Hwy.
Coral Gables, Florida 33146

Phone: 305-284-5120
Fax: 305-284-4929
oaa.miami.edu

MEMORANDUM

DATE: February 20, 2019

TO: Alfred Mettler, Department of Finance
Miami Business School

FROM: Patty Murphy, Associate Provost of University Accreditation
Office of Assessment and Accreditation

RE: <u>New Financial Technology Minor</u>

On February 20, 2019, the Miami Business School notified my office of its intent to offer a new undergraduate minor, Financial Technology (also called "Fintech"), within its undergraduate degree programs effective Fall 2019. The program is being created to prepare students for careers in the emerging "Fintech" industry.

The proposed minor will require successful completion of 12 credit hours. Three new courses will be created to support the program.

Financial Technology Minor Curriculum:

- FIN 410 Financial Institutions and Markets (3 credit hours)
- FIN 418 Fundamentals of Fintech (NEW) (3 credit hours)
- BTE 422 Technology Foundations of Fintech (NEW) (3 credit hours)
- BTE 420 Python Programming for Fintech (NEW) (3 credit hours)

The minor will also require the following two pre-requisite courses:
- FIN 302 Fundamentals of Finance (3 credit hours)
- FIN 320 Investments and Security Markets (3 credit hours)

The proposed new undergraduate minor does not "represent a significant departure, either in content or method of delivery" from what we are currently approved by SACSCOC to offer due to the following:

- Although three new courses will be created for the minor, they do not constitute a significant change from currently approved programs.
- The new program will be supported by current qualified faculty. No new faculty will be hired.
- The majority of the program will not be offered via distance education and, in any case, the University is approved to offer 100% distance education programs.
- The program will be offered on the University's Coral Gables campus.

SACSCOC only requires notification of program changes that represent a significant departure from our current programs. Therefore, no notification or approval is required for this change.

Please contact me if you have any questions at pattymurphy@miami.edu or (305) 284-3276.

CC: Faculty Senate
        John Quelch, Dean of the Miami Business School
        Ann Olazabal, Vice Dean, Undergraduate Business Education
        Karen Beckett, University Registrar
        Carrie Glass, Executive Director of Student Financial Assistance and Employment

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Office of the Dean	PO Box 248027	Ph. 305-284-4643
	Coral Gables, Florida 33124-6520	Fax. 305-284-6526

TO: Tomas Salerno
             Chair, Faculty Senate

FROM: John Quelch
             Dean

CC: Brian Barrett, Chair of School Council
             Ann Olazabal, Vice Dean for Undergraduate Business Education

SUBJECT: Fintech Minor

DATE: February 1, 2019

Dear Dr. Salerno and the entire Faculty Senate:

I write to extend my enthusiastic support of the establishment of the new undergraduate Fintech minor. The proposal is a joint effort by the FIN and BTE departments and was developed during Summer/Fall 2018. Subsequently the Fintech minor proposal has been unanimously approved by the Finance department on Nov 12, 2018, by the Business Technology department on Nov 14, 2018, by UBEC on Dec 5, 2018, and by School Council on Jan 18, 2019.

The proposed Fintech minor combines classes in Finance and Technology and prepares students for careers in the broader Fintech industry. Graduates who understand the fundamental aspects of Fintech are in high demand, and MBS wants be at the forefront of higher education in this area.

The curriculum of this minor will undoubtedly enrich our BBA and BSBA students' skills in the global business arena and augment their future careers. It has the full support of Miami Business School.

Thank you for your support and collaboration. I look forward to working with the Faculty Senate on other matters in the future.

Professor John Quelch
Dean, Miami Business School

MIAMI
BUSINESS SCHOOL

Memorandum

To: Undergraduate Business Education Committee

From: Alok Kumar, Chair Finance Department

Re: Proposal for a Fintech Minor

Date: November 13, 2018

Background and support:

The FIN and BTE departments propose the creation of a Fintech minor. The minor will consist of two FIN classes and two BTE classes as follows:

- The proposed two FIN classes in the minor are FIN 410 (Financial Institutions and Markets) and FIN 418 (Fundamentals of Fintech)
- The BTE department proposes two new classes which will complement the two FIN classes: BTE 420 (Python Programming for Fintech) and BTE 422 (Technology Foundations of Fintech)

The attached documents outline the structure and content of the minor as well as the reasons for its creation.

The proposal was discussed at the Department Faculty meeting on Nov 12 and unanimously approved by the faculty.

Department of Business Technology
421 Jenkins
Coral Gables, FL 33124

Memorandum

To: Undergraduate Business Education Committee

From: Robert Plant, Chair Department of Business Technology

Re: Proposal for a Fintech Minor

Date: November 26, 2018

Background and support:

The FIN and BTE departments propose the creation of a Fintech minor. The minor will consist of two FIN classes and two BTE classes as follows:

- The proposed two FIN classes in the minor are FIN 410 (Financial Institutions and Markets) and FIN 418 (Fundamentals of Fintech)
- The BTE department proposes two new classes which will complement the two FIN classes: BTE 420 (Python Programming for Fintech) and BTE 422 (Technology Foundations of Fintech)

The attached documents outline the structure and content of the minor as well as the reasons for its creation.

The proposal was discussed at the Department Faculty meeting on Nov 14 and unanimously approved by the faculty.

UNIVERSITY OF MIAMI

New Course Request

Date of Request: 10/4/2018   **Effective Term:** Spring 2019   **School/College:** Business

■ **New Course**	☐ **New Experimental Course**	☐ **Reactivate Course**	***Syllabus must be attached***

Subject Area: *(ex: ENG)*	FIN	**Catalog Number:** *(ex: 105)*	418	**Units** **Min:** 3	**Max:** 3

Short Course Title: *(30 characters maximum)*	Fundamentals of Fintech	**Course Will Be Offered:** *(Ex: Fall, Spring, Summer)*	By announcement

Long Course Title: *(100 characters maximum)*	Fundamentals of Fintech

Full-time Status Rationale: This is required only for courses flagged as being equivalent to full-time status. Rationale must include why the course(s) are equivalent to full-time credit (12+ credits for undergraduate; 9+ credits for graduate. Please email the Full-Time Status Rationale as a Word document to scheduling.rg@miami.edu.

Course Description - Must be submitted with form and emailed as a Word document to scheduling.rg@miami.edu

Additional Course Information - Select all fields applicable

Grading Basis: *(Please select one)*	**Please Indicate**	**Add Consent**	**Please Indicate**	**Drop Consent**	**Please Indicate**
Audit	☐	Department	☐	Department	☐
Credit/No Credit	☐	Instructor	☐	Instructor	☐
Graded	✔				
Medical Graduate	☐	**Repeat For Credit Rules**	**Please Indicate**	**Attributes**	**Please Indicate**
Medical Grades	☐	Repeat for Credit	☐	CIVIC	☐
No Grade	☐	Total # Completions Allowed	_____	PRISM	☐
Non-Graded	☐	Allow to be taken more than once in same term	☐	WRITING	☐
Satisfactory/UnSat.	☐			CAPSTONE	☐

Areas of Knowledge: *(select one)*	☐ AH/Arts & Humanities	☐ PS/People & Society	✔ STEM

You may select multiple components for a course, but only ONE Primary Graded Component

Course Components	**Primary Graded Component**	**Please Indicate**	**Course Components**	**Primary Graded Component**	**Please Indicate**
Clinical	☐	☐	Lessons	☐	☐
Discussion	☐	☐	Module	☐	☐
Distance Learning	☐	☐	Practicum	☐	☐
Ensemble	☐	☐	Research	☐	☐
Experiential Learning	☐	☐	Seminar	☐	☐
Field Studies	☐	☐	Studio	☐	☐
Forums	☐	☐	Thesis Research	☐	☐
Independent Study	☐	☐	Thesis/Individual Study	☐	☐
Laboratory	☐	☐	Workshop	☐	☐
Lecture	✔	☐			

New Course Request

*Subject Area: FIN	*Catalog #: 418

Enrollment Requirement – Pre-Requisite/Co-Requisite/Condition/Placement

Please write out fully the Enrollment Requirement and/or Requisite Conditions and/or Placements. Use Boolean connectors "And" or "Or". (see examples below.)

Add	School/Coll.	Enrollment Requirement with Conditions and Placements specified with "And" or "Or"
☒	AS	Example: (Pre-Requisite: MTH 141 Or 151 Or 161) Or (Co-Requisite: MTH 171 And (ALEKS score >=60 Or SAT >=630 Or ACT >=28))

Add	School/Coll.	Enrollment Requirement/ Condition/Placement Please use Boolean connectors "And" or "Or"
☑	BU	FIN 303 And FIN 320
☐		

UNIVERSITY
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New Course Request

*Subject Area: FIN   ***Catalog #:** 418

Course Topics		
If the course has special topics, please use below fields to specify each topic		
Examples:		
1	**Global Detective Fiction**	
2	**Literature and Law**	
3	**Monsters**	
Course Topic #	**Description** *(30 characters maximum)*	
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Department Scheduler Name: Michelle M. Ruales   **Extension:** 8-4362

Department Chair: _____
(Signature Required)   **Date:** 10/4/2018

Curriculum Academic Dean: _____
(Signature Required)   **Date:** _____

University of Miami • Office of the Registrar • P.O. Box 248026, Coral Gables, FL 33146
Email: scheduling.rq@miami.edu   Updated: 5/30/2018

New Course Request

Date of Request: 11/26/2018   **Effective Term:** Spring 2019   **School/College:** MBS

✓ **New Course**	☐ **New Experimental Course**	☐ **Reactivate Course**	***Syllabus must be attached***

Subject Area: (ex: ENG)	**BTE**	**Catalog Number:** (ex: 105)	**420**	**Units Min:**	**3**	**Max:**	**3**

Short Course Title: (30 characters maximum)	Programming for Fintech	**Course Will Be Offered:** (Ex: Fall, Spring, Summer)	Fall,Spring,Summer

Long Course Title: (100 characters maximum)	Python Programming for Fintech

Full-time Status Rationale: This is required only for courses flagged as being equivalent to full-time status. Rationale must include why the course(s) are equivalent to full-time credit (12+ credits for undergraduate; 9+ credits for graduate. Please email the Full-Time Status Rationale as a Word document to scheduling.rg@miami.edu.

Course Description - Must be submitted with form and emailed as a Word document to scheduling.rg@miami.edu

Additional Course Information – Select all fields applicable

Grading Basis	Add	Remove	Add Consent	Add	Remove	Drop Consent	Add	Remove
Audit	☐	☐	Department	☐	☐	Department	☐	☐
Credit/No Credit	☐	☐	Instructor	☐	☐	Instructor	☐	☐
Graded	✓	☐						
Medical Graduate	☐	☐	**Repeat for Credit Rules**	**Add**	**Remove**	**Attributes**	**Add**	**Remove**
Medical Grades	☐	☐	Repeat for Credit	✓	☐	CIVIC	☐	☐
No Grade	☐	☐	Total # Completions Allowed	2		PRISM	☐	☐
Non-Graded	☐	☐	Allow to be taken more than once in same term	☐	☐	WRITING	☐	☐
Satisfactory/UnSat.	☐	☐				CAPSTONE	☐	☐

Areas of Knowledge: (select one)	☐ AH/Arts & Humanities ☐ PS/People & Society ✓ STEM	SUSTAINABILITY	☐	☐
		QEP	☐	☐

UNIVERSITY
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New Course Request

Date of Request: BTE   **Effective Term:** 420   **School/College:** MBS

You may select multiple components for a course, but only ONE Primary Graded Component							
Course Components	**Primary Graded Component**	**Add**	**Remove**	**Course Components**	**Primary Graded Component**	**Add**	**Remove**
Clinical	☐	☐	☐	Lessons	☐	☐	☐
Discussion	☐	☐	☐	Module	☐	☐	☐
Distance Learning	☐	☐	☐	Practicum	☐	☐	☐
Ensemble	☐	☐	☐	Research	☐	☐	☐
Experiential Learning	☐	☐	☐	Seminar	☐	☐	☐
Field Studies	☐	☐	☐	Studio	☐	☐	☐
Forums	☐	☐	☐	Thesis Research	☐	☐	☐
Independent Study	☐	☐	☐	Thesis/Individual Study	☐	☐	☐
Laboratory	☐	☐	☐	Workshop	☐	☐	☐
Lecture	✓	☐	☐	Flipped Classroom	☐	☐	☐
Harkness	☐	☐	☐	Intergroup Dialogue	☐	☐	☐
Problem Based Learning	☐	☐	☐				

Enrollment Requirement – Pre-Requisite/Co-Requisite/Condition/Placement

Please write out fully the Enrollment Requirement and/or Requisite Conditions and/or Placements.
Use Boolean connectors "And" or "Or". (See examples below.)

Add	Remove	School/Coll.	Enrollment Requirement with Conditions and Placements specified with "And" or "Or"
☒	☐	AS	Example: (Pre-Requisite: MTH 141 *Or* 151 *Or* 161) *Or* (Co-Requisite: MTH 171 *And* (ALEKS score >=60 *Or* SAT >=630 *Or* ACT >=28))
☐	☒	AS	Example: Remove Co-Requisite: MTH 171 only

Add	Remove	School/Coll.	Enrollment Requirement/ Condition/Placement — Please use Boolean connectors "And" or "Or"
☐	☐		
☐	☐		

New Course Request

Date of Request: 11/26/2018   **Effective Term:** Spring 2019   **School/College:** MBS

Course Topics

If the course has special topics, please use below fields to specify each topic. See examples below.

☒	☐	**3**	**Literature and Law**
☐	☒	**10**	**Monsters**

Add	Remove	Course Topic #	Description (30 characters maximum)
☐	☐		
☐	☐		
☐	☐		
☐	☐		
☐	☐		
☐	☐		
☐	☐		
☐	☐		

Department Scheduler Name: Evaline Fornino	**Extension:** 8-6105

Department Chair: _____ (Signature Required)   Date: 11/26/18

Curriculum Academic Dean: _____ (Signature Required)   Date:

UNIVERSITY OF MIAMI

New Course Request

Date of Request: 11/26/2018		**Effective Term:** Spring 2019	**School/College:** MBS	

✓ **New Course**	☐ **New Experimental Course**	☐ **Reactivate Course**	***Syllabus must be attached***

Subject Area: *(ex: ENG)*	**BTE**	**Catalog Number:** *(ex: 105)*	422	**Units Min:** 3	**Max:** 3

Short Course Title: *(30 characters maximum)*	Tech Foundations of Fintech	**Course Will Be Offered:** *(Ex: Fall, Spring, Summer)*	Fall,Spring,Summer

Long Course Title: *(100 characters maximum)*	Technology Foundations of Fintech

Full-time Status Rationale: This is required only for courses flagged as being equivalent to full-time status. Rationale must include why the course(s) are equivalent to full-time credit (12+ credits for undergraduate; 9+ credits for graduate. Please email the Full-Time Status Rationale as a Word document to scheduling.rg@miami.edu.

Course Description - Must be submitted with form and emailed as a Word document to scheduling.rg@miami.edu

Additional Course Information – Select all fields applicable

Grading Basis	Add	Remove	Add Consent	Add	Remove	Drop Consent	Add	Remove
Audit	☐	☐	Department	☐	☐	Department	☐	☐
Credit/No Credit	☐	☐	Instructor	☐	☐	Instructor	☐	☐
Graded	✓	☐						
Medical Graduate	☐	☐	**Repeat for Credit Rules**	**Add**	**Remove**	**Attributes**	**Add**	**Remove**
Medical Grades	☐	☐	Repeat for Credit	✓	☐	CIVIC	☐	☐
No Grade	☐	☐	Total # Completions Allowed	2		PRISM	☐	☐
Non-Graded	☐	☐	Allow to be taken more than once in same term	☐	☐	WRITING	☐	☐
Satisfactory/UnSat.	☐	☐				CAPSTONE	☐	☐
Areas of Knowledge: *(select one)*	☐ AH/Arts & Humanities	☐ PS/People & Society	✓ STEM			SUSTAINABILITY	☐	☐
						QEP	☐	☐

UNIVERSITY
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New Course Request

Date of Request: BTE **Effective Term:** 422 **School/College:** MBS

You may select multiple components for a course, but only <u>ONE</u> Primary Graded Component

Course Components	Primary Graded Component	Add	Remove	Course Components	Primary Graded Component	Add	Remove
Clinical	☐	☐	☐	Lessons	☐	☐	☐
Discussion	☐	☐	☐	Module	☐	☐	☐
Distance Learning	☐	☐	☐	Practicum	☐	☐	☐
Ensemble	☐	☐	☐	Research	☐	☐	☐
Experiential Learning	☐	☐	☐	Seminar	☐	☐	☐
Field Studies	☐	☐	☐	Studio	☐	☐	☐
Forums	☐	☐	☐	Thesis Research	☐	☐	☐
Independent Study	☐	☐	☐	Thesis/Individual Study	☐	☐	☐
Laboratory	☐	☐	☐	Workshop	☐	☐	☐
Lecture	✓	☐	☐	Flipped Classroom	☐	☐	☐
Harkness	☐	☐	☐	Intergroup Dialogue	☐	☐	☐
Problem Based Learning	☐	☐	☐				

Enrollment Requirement – Pre-Requisite/Co-Requisite/Condition/Placement

Please write out fully the Enrollment Requirement and/or Requisite Conditions and/or Placements.
Use Boolean connectors "And" or "Or". (See examples below.)

Add	Remove	School/Coll.	Enrollment Requirement with Conditions and Placements specified with "And" or "Or"
☒	☐	AS	Example: (Pre-Requisite: MTH 141 Or 151 Or 161) Or (Co-Requisite: MTH 171 And (ALEKS score >=60 Or SAT >=630 Or ACT >=28))
☐	☒	AS	Example: Remove Co-Requisite: MTH 171 only

Add	Remove	School/Coll.	Enrollment Requirement/ Condition/Placement Please use Boolean connectors "And" or "Or"
☐	☐		
☐	☐		

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New Course Request

Date of Request: 11/26/2018   **Effective Term:** Spring 2019   **School/College:** MBS

Course Topics

If the course has special topics, please use below fields to specify each topic. See examples below.

☒	☐	3	Literature and Law
☐	☒	10	Monsters

Add	Remove	Course Topic #	Description (30 characters maximum)
☐	☐		
☐	☐		
☐	☐		
☐	☐		
☐	☐		
☐	☐		
☐	☐		
☐	☐		

Department Scheduler Name: Evaline Fornino	**Extension:** 8-6105

Department Chair: _N.Mart_ (Signature Required)   **Date:** 11/26/18

Curriculum Academic Dean: _____ (Signature Required)   **Date:** _____

MIAMI
BUSINESS SCHOOL

Department of Finance

5250 University Drive
Coral Gables, FL 33146
www.bus.miami.edu

Course Syllabus FIN 418

Fundamentals of Fintech

Fall Semester 2019
Class Number: tbd

Day / Time
Classroom: tbd

The course outline provides a general plan for the course, deviations may be necessary

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Course Objective:

This course introduces students to Fintech, the emerging world of applications, concepts, developments, business models, and companies at the interface of Finance and Technology. The course format is a mixture of introductory topical lectures, class discussions, and interactive seminar-style student presentations. It covers the main Fintech areas like Peer-to-Peer-Lending, Crowdfunding, Mobile Payment Systems, Cryptocurrencies and ICOs, Robo Advising, Insurtech (insurance technology), and RegTech (regulatory technology). A special emphasis is given to how and by whom these emerging technologies are currently used, and how they may potentially change the landscape of finance and financial services in the future.

Upon completion of the course, students will be able to:
a) Gain an understanding and appreciation of the Fintech Ecosystem, its origins, and possible future development paths
b) Become familiar with the main fintech areas: Lending, crowdfunding, mobile payments, cryptocurrencies, financial advising
c) Examine the theory of financial intermediation, apply it to peer-to-peer lending, and analyze the business models of selected peer-to-peer lenders
d) Describe strengths/weaknesses of current global payment systems and understand the additional contributions of Fintech-based mobile payment systems
e) Describe the types, role and functioning of cryptocurrencies, compare them to the existing monetary/currency systems, and understand the arguments for/against cryptocurrencies
f) Examine recent developments in special Fintech areas like robo advising, insurtech, regtech, and compare them to the comparable "traditional" approaches
g) Discuss how Fintech technologies could be integrated into new entrepreneurial business ideas

Prerequisites: FIN 302, FIN 303 or FIN 320

It is assumed that students are familiar with the fundamental principles of accounting, finance and valuation techniques (as covered in the prerequisite).

Instructor: **Dr. Alfred Mettler**

514-P Jenkins Building
Phone: 305-284-9394 (Office)
E-Mail: amettler@bus.miami.edu

Office hours: tbd

Course Information and Policies

The course syllabus provides a general plan for the course, deviations may be necessary

A. Course Materials

(1) **Required Course Packet,** accessible via www.study.net, containing case studies, readings, book-chapters, and other copyrighted material. More detailed information about www.study.net and the course packet will be given during the first class meeting.
It is mandatory that every student attending the class signs up and pays for the material individually. A final class grade cannot be given if a student is not enrolled in www.study.net and has paid for the course material.

(2) **Additional reading**: Each student will choose a book from a list, provided by the instructor. One of the assignments will be to write an executive summary of and answer several questions about the book. Details, procedures and deadlines will be explained in class.

(3) **Miscellaneous articles and other information** of interest to be distributed throughout the course via Blackboard (or via e-mail).

(4) **Class handouts**: Will be posted on the UM Blackboard Website, or distributed via e-mail. You will have to bring the handouts to class, either as a print-out or in digital form

(5) It is necessary that you have a **financial calculator** to use throughout the course. **Bring your calculator to class each week!**

Students are strongly encouraged to look for current Fintech examples and articles as reported in the **Wall Street Journal**, **The Economist**, Business Week, Fast Company, Fortune, Wired, and/or other relevant business publications.

B. UM Blackboard Course Website

The blackboard course website will be used extensively for the class. The relevant course materials (handouts assignments, announcements, etc.) will be posted there. Further instructions in how to use the course-website will be made in class.

Administrative announcements will be sent out on a regular basis via e-mail to the students registered for the class.

C. Attendance

Each student is expected to attend all scheduled class meetings for the entire duration of the class meeting. An attendance sign-up sheet will be circulated each class period. There will be a lot of self-learning and teamwork during class times, so attendance is critical.

Please notify the instructor before the class if you have to miss a lecture, or if you have to leave early. The finance department requires students to attend at least 80% of the classes to receive a passing grade. Furthermore poor attendance will negatively affect your participation grade.

The course is "seminar-style", which means there will be short lectures by the instructor, followed by student presentations, interactive discussions, project work, assignments, etc. Therefore class participation is essential.

D. Academic Integrity

All students are responsible for reading, understanding, and upholding the UM Honor Code. Students are expected to warn fellow students who do not appear to be observing proper ethical standards and to report violations of the UM Honor Code. Any violations of these policies will result in referral to the appropriate administrative body.

More specific information about Academic Integrity can be found here (in case the link does not work, the url is: http://www.bus.miami.edu/academic-programs/undergraduate-business-education/academic-advising/academic-integrity.html)

Students are encouraged to discuss any questions they may have pertaining to the provisions of the policy on Academic Integrity prior to submitting assignments. Lack of knowledge of the contents of the policy on Academic Integrity is not an acceptable defense to any charge of academic dishonesty.

E. Other University Policies and Procedures

The foundation of the UM School of Business community is a shared commitment to the University's core values – achievement and purpose, innovation and adaptability, community and teamwork, and integrity and responsibility. The guidelines and policies that support the values that create UM's distinctive learning environment can be found here (in case the link does not work, the url is http://www.bus.miami.edu/current-students/undergradauate/essentials/policies.html) and here (in case the link does not work, the url is http://www.bus.miami.edu/current-students/graduate/index.html). The website explains various policies and procedures, like for example Academic Standing, Classroom Conduct, and others.

Various other university procedures (including, but not limited to, the final exam policy and religious holy day policy) can be found here (in case the link does not work, the url is: http://bulletin.miami.edu/general-university-information/university-policies/course-information/).

Laptops, cell phones, smartphones, PDAs and other electronic devices (such as recording equipment) must not be used during class, except with the explicit permission of the instructor.

A refreshing beverage can be brought to the class, however, the bringing food into the classroom or the eating of food during class time is not allowed.

F. Exams, Assignments, Projects, and Grading

There will be two exams and several quizzes given during the semester.

Furthermore, the students will will work on team projects and individual projects. Specific assignments and due dates will be announced in class.

Assignments, quizzes, projects and exams can be in-class, take-home, or online. A Financial Calculator is necessary during examinations.

There will be no make-up quizzes/exams given. There will be no extra projects/exams/ papers given to make up for under-performance. If missing any course assessment/exam is excused by the instructor, the weight of the missed grade component will be transferred to the weight of the final exam.

UM, Department of Finance   - 4 -   **Fundamentals of Fintech**
Alfred Mettler   **FIN 418, Fall 2019**

If missing any course assessment/exam is not excused by the instructor, the grade of this course assessment/exam will be Zero.

The Grade weights will be:

- Quizzes and exams   25%
- Individual final project   25%
- Team projects   25%
- Attendance, participation   25%

All course grades, once assigned, are final and cannot be changed except in the event of a mathematical miscalculation by the instructor.

G.   Course Outline

Students are responsible for knowledge of any administrative announcements (e.g. test information, schedule and/or assignment changes etc.) made at any time during scheduled class periods, regardless of being present or not.

Furthermore administrative announcements will be sent out on a regular basis via the Blackboard website and via e-mail.

The course outline provides a general plan for the course, deviations may be necessary

Weeks	Dates	Topics to be covered	Based on following material
1		**Introduction and Overview, Organisation of class** **The Fintech Ecosystem** - Origins and history - Areas and current state - Possible future developments	CB Insights: Global Fintech Report Q2 2018 https://youtu.be/k4aKQYCxxYY CB Insights: Amazon in Financial Services https://youtu.be/K0EBJRMrWyl
2		**The Fintech Ecosystem** - Origins and history - Areas and current state - Possible future developments - Banks and fintech - Entrepreneurial opportunities - Strategies moving forward	Banks vs Fintech http://fintechnews.ch/fintech/banks-vs-fintech-fintegration-smartest-move-says-new-survey/2043/ Case "Cutting through the Fog – Finding a Future with Fintech" (www.study.net)
3		**Peer-to-peer lending** - Theory of financial intermediation - Classic bank lending - Development of P2P lending - P2P business models	Handouts "Financial Intermediation and Bank Lending I" (Blackboard) Case "MPOWERing Global Students" (www.study.net) Team presentations
4		**Peer-to-peer lending** - Credit risk assessment - Credit risk management - Credit risk in P2P business models - P2P across the globe	Handouts "Financial Intermediation and Bank Lending II" (Blackboard) Reading "On the Rise of Fintechs – Credit Scoring Using Digital Footprints" (Blackboard) Team presentations

Weeks	Dates	Topics to be covered	Based on following material
5		**Peer-to-peer lending** - Digital footprints - Alternative measures of credit risk - Rating, scoring, default probabilities - P2P examples: Contrast and compare	Handouts "Financial Intermediation and Bank Lending III" (Blackboard) Case "Discriminant Analysis" (Blackboard) Team presentations
6		**Peer-to-peer lending / Crowdfunding** - P2P examples: Contrast and compare - P2P business models - Financing with debt and equity	P2P Summary Case "Roast, Grind, Brew, Kickstart" (www.study.net)
7		**Crowdfunding** - Classic corporate finance - Crowdfunding platforms and business models - Crowdfunding successes and failures	Case "MilkMade Ice Cream: Running a Successful Crowdfunding Campaign" (www.study.net) The 10 Biggest Crowdfunding Campaigns, WSJ 4/30/2018
8		**Mid Term Exam** **Mobile payment systems** - Global payment systems, SWIFT, IBAN, - Domestic payment systems, credit card transactions - Fintech companies in the payment industry	Handouts "Payment Systems" (Blackboard)
9		**Mobile payment systems** - Fintech companies in the payment industry - Partnerships with financial institutions - Applications and Developments	Case "Fintech, Payments Innovation, and the Acquisition of Worldpay" (www.study.net)

Weeks	Dates	Topics to be covered	Based on following material
10		**Cryptocurrencies, ICOs, and blockchain technology** - Traditional monetary/currency systems - Blockchain technology - Examples and design of cryptocurrencies	Case "An Introduction to Blockchain" (www.study.net) Reading "Blockchain, Cryptocurrencies and Digital Assets" (www.study.net)
11		**Cryptocurrencies, ICOs, and blockchain technology** - Traditional monetary/currency systems - Blockchain technology - ICOs	Case "Bitcoin: Investment or Illusion?" (www.study.net) Case "Getting Rich on Crypto" (www.study.net)
12		**Cryptocurrencies, ICOs, and blockchain technology** - Traditional monetary/currency systems - Blockchain technology - ICOs	Case "Initial Coin Offerings" (www.study.net) tbd
13		**Other Fintech areas** - Insurtech examples - Regtech examples - Robo advising	Presentations of final projects tbd
14		**Other Fintech areas** - D2C commerce examples - Big data applications - Internet of things IoT	Presentations of final projects tbd
		Final project / exam	tbd

UNIVERSIY OF MIAMI
MIAMI BUSINESS SCHOOL

BTE 420: Python Programming for FinTech

Semester: Fall 2019
Section: TBA
Credits: 3

Class Hours: TBA
Classroom: TBA

Instructor: Tarek Sayed
Office Location: Jenkins 423E
Office Hours: By appointment.

Telephone: 305.284.4316
E-mail: tarek@miami.edu
Fax: 305.284.5161

Course Description

This Course covers the fundamentals of programming logic and structured programming principles including problem solving, algorithm design, and program development using Python with focus on financial programming applications. The course introduces the student to object-oriented programming through a study of the concepts of program specification and design, algorithm development, and coding and testing using a modern software development environment. Students learn how to write programs in an object-oriented high-level programming language (Python). Topics covered include fundamentals of algorithms, flowcharts, problem-solving, programming concepts and methodologies, control structures, arrays, and strings, classes and class-methods, data structures and object oriented programming concepts including classes, methods, inheritance and polymorphism. Throughout the semester, theses programming concepts and problem-solving skills will be will be applied to solving financial computing problems. Weekly assignments will provide extensive hands-on experience in topics covered in this course and a final project will enable the student to analyze, design and implement a full problem in the FinTech space.

Prerequisite: None

1

Learning Objectives

At the end of the semester, students will be able to demonstrate working knowledge of the techniques and theory associated with programming for financial applications, including an understanding of:

- Programming concepts and techniques.
- Python language syntax.
- Control statements, loops, functions, lists and other data structures/containers.
- Basic techniques of dealing with data such as sorting and implementing simple data structures.
- Writing simple file IOs.
- Writing programs for a wide variety problems in statistics, math, science, financials, and games.
- Analyze and design programs.
- Introduction to the concepts of OOP and reusing software and familiarity with Python predefined classes and libraries.
- Linearity in finance
- Non Linearity in finance
- Numerical Procedures
- Interest Rates and Derivatives
- Trading Algorithms and Systems
- Backsetting
- Big Data and Machine Learning financial algorithms

Output

At the end of the course, the student will be able to design and develop a complete application focusing on finance concepts using the Python programming language.

2

IMPORTANT COURSE POLICIES:
CLASSROOM CONDUCT POLICY*
SCHOOL OF BUSINESS ADMINISTRATION

The following are policies students should assume are in force in the School of Business Administration courses, unless their instructors explicitly establish alternate policies.

Laptops, Cell Phones, Smartphones, PDAs and Other Electronic Devices (such as recording equipment) may not be used during class except at the express discretion of the instructor.

Attendance

Each student is required to attend every class and attendance will be part of the grade. Faculty will excuse absences only in cases of documented serious illness, religious observance, civic obligation or participation in an activity approved by the Academic Deans Policy Council. Otherwise your attendance is expected. If you will miss class for religious observance or a civic obligation, you must inform your instructor at least one week in advance.

Any other absences such as absences for work related travel, or family emergency may be excused at the discretion of the faculty upon receiving supporting documentation. It is the student's responsibility to contact the instructor within one week after any unanticipated absence. Instructors and administrators shall endeavor not to schedule any examination or other graded class event on a major religious holy day.

Arriving Late, Leaving Early, Coming & Going

Classes start on time and students must arrive to class on time and stay to the end of the class period. Students may enter class late only if given permission by the instructor, and only if they can do so without disrupting the class. In addition,

• Students may not leave and re-enter the class once class has started except by permission from the instructor, and only if they can do so without disrupting the class.

• Arriving late or leaving class early will have impact on the course grade as determined by the instructor. Please note that instructors are not obligated to admit late students or may choose to admit them only at specific times. Instructors are not obligated to readmit students who leave class.

Late Submission of Assignments

Late assignments will either not be accepted or will incur a grade penalty unless they are due to documented serious illness or a family emergency. Instructors may make exceptions to this policy for reasons of religious observance or civic obligation, only when the assignment cannot reasonably be completed prior to the due date and the student makes arrangements for late submission with the instructor in advance.

General Behavior

Students will conduct themselves with respect and professionalism toward faculty, students, and others present in class and will follow the rules prescribed by the instructor for classroom behavior. Students who fail to do so may be asked to leave the classroom with a grade penalty.

Collaboration on Graded Assignments

Students may not work together on graded assignments unless the instructor gives express permission or unless explicitly indicated on the course syllabus.

*Endorsed by the Vice Deans and Department Chairs

Disabilities Information

Accommodations for disabilities will only be given to students who have secured the proper documentation from UM's Office for Student Disabilities. Such documentation must be provided to the instructor within the first two weeks of the start of class. Students should contact the Office of Disabilities to secure appropriate accommodations.

3

Textbooks

1. An Introduction to Programming Using Python plus MyProgrammingLab with Pearson eText --
Access Card Package, Schneider ©2016 | Pearson | Available ISBN-13: 9780134089454 ➔ (Text1)

2. Mastering Python for Finance, James Ma Weiming, ISBN-13: 978-1784394516, ISBN-10:
1784394513 ➔ (Text2)

Schedule

Week 1: Introduction to Computer Programming and Python Basics

We will start the course by discussing the evolution of computer programming and the
differences between different programming languages (compiled vs interpreted). During class,
we will walk through the installation of the Python engine and development tools such as
PyCharm, Cloud9 or the Python IDLE as options.

The second lecture will introduce Python language basics such as variables and assignments,
numbers, strings, input output, data types and expressions.

Readings:

- Chapter 1: Text1
- Chapter 2: Text1

Assignment:

- Installation of development environment and a simple Python program.

Week 2: Introduction to Python Data Containers (Lists, Tuples and Sets), Files, and Flow of Control

Lists in Python are the equivalent of dynamic arrays or vectors in other languages. The first
lecture will introduce lists and other data containers such as tuples along with their indexing
and slicing capabilities, methods and a brief introduction to the mutability/immutability concept
of different variables in preparation for a latter explanation of the mutability of list objects as
the equivalent of reference parameters in other languages.

A brief introduction to files and how to read and write data to files will be presented. We will
elaborate on this further, later in the course.

4

The second lecture will focus primarily on the flow of control of a program – if, else, and elif. This will be the time to introduce logical/boolean and relational expressions, and start the discussion of the different kind of loops in Python.

Readings:

- Chapter 3: Text1
- Chapter 4: Text1

Assignment:

- A problem set focusing on the concepts of lists and flow of control will be assigned

Week 3: Flow of Control (Continued) and User Defined Functions

The first lecture will be a continuation of loops followed by the introduction of user defined functions. We will explore void functions and value returning functions in Python. This will be the time to introduce concepts of structured and modular programming, procedural abstractions and top-down program design. We will also revisit the passing of parameters by value and by reference and discuss the mutability of lists.

The second lecture will be a discussion of processing data the different ways we read data from and write data to files and how I/O streams work in Python. The lecture will also introduce Python dictionaries and how to use key/value pairs to represent and process data.

Readings:

- Chapter 4: Text1
- Chapter 5: Text1

Assignment:

- A problem set focusing on reading data from files and writing data processing functions to store the data in lists, dictionaries, sets and tuples will be assigned.

Week 4: Recursion and Object-Oriented Programming

In the first lecture, we will cover recursive functions – we will explore the application of recursive algorithms and contexts where recursion is more applicable. We will discuss tail and non-tail recursions and we will code some famous recursive examples such as the Fibonacci sequence and Tower of Hanoi problems.

The second lecture will be an introduction to Object Oriented Programming in Python. The lecture will present the abstraction concepts of OOP. We will code Python classes and introduce constructors, method overriding and operator overloading in Python. The concepts of inheritance and how Python handles polymorphism will also be presented.

Readings:

- Chapter 5: Text1
- Chapter 6: Text1

Assignment:

- A problem set focusing on reading data from files and writing data processing functions to store the data in lists, dictionaries, sets and tuples will be assigned.

Week 5: Object-Oriented Programming (Continued)

We will spend the both lectures coding a significant OOP problem with multiple classes and data manipulations. The problem will be published prior to class for review, and we will solve it in class.

Readings:

- Chapter 6: Text1

Assignment

- A significant problem that involves class design and use of OOP concepts to represent and process data will be given.

Week 6: Algorithmic Complexity and Data Structures

We will introduce concepts of algorithmic complexity and have a deeper dive into other standard data structures concepts (linked lists, queues, and stacks) and how they are coded/used in Python. There are some classes such as the collections.deque class that we will look at.

Readings:

- Suplementary materials will be posted.

Assignment

6

- Exam Review Problems – students could bring questions to an optional review session.

Week 7: Special Python Packages - Pandas, numpy, SciPy, scikit learn, matplotlib ((Continued))

Now that the student has mastered programming concepts and specific Python syntax and approaches to different programming concepts, we will focus on packages that offer tools to manipulate data and perform complex scientific functions. We will introduce a high level overview of Pandas as a high performance data manipulation and analytics tool and the complex data structures it offers. We will also introduce the concept of multidimensional arrays of numpy as an important Python package for scientific computing.

The lectures will present a high level overview of the packages but the student will be expected to use the skills gained so far to use the proper data structures and functions in these packages through research

A large data set will be used as an example to code in class. The example will introduce the student to the concept of a data frame and how it is used to represent and manipulate data.

Readings:

- Pandas Cookbook
- NumPy Tutorials and Documentation

Week 8: Special Python Packages - Pandas, numpy, SciPy, scikit learn, matplotlib ((Continued))

We will continue discussing the packages with an overview of the functionalities of SciPy scientific and mathematical uses and functions, matplotlib for visualization techniques and scikit learn built on those packages for data mining and analytical techniques.

The lectures will present a high level overview of the packages but the student will be expected to use the skills gained so far to use the proper data structures and functions in these packages through research

Again, a large data set will be used as an example to code in class. The example will now illustrate the use of all these packages together and using visualization effects and practice excercises.

Readings:

- SciPy
- scikit learn
- matplotlib

Assignment:

7

- A programming problem with a data set to apply analytical and visualization techniques will be assigned.

Week 9: Introduction to Python for Financial Applications, Linearity and Nonlinearity in Finance

The discussion will focus on using Python to solve linear algebra problems such as solving systems of linear equations and matrix algebra. The student will learn how to apply concepts of linear algebra to perform linear optimization of portfolio allocation and how to implement these concepts in Python.

We will also use Python and the SciPy package to implement nonlinear financial models and root finding methods and to explore concepts of integer programming.

Reading:

- Chapter 2: Text2
- Chapter 3: Text2

Assignment:

- A programming problem set focusing on concepts of linear and non-linear models will be assigned.

Week 10, 11: Numerical Procedures

The discussion will focus on options, option pricing models, and volatility modeling. We will introduce different techniques for options valuation such as trees, lattices and differencing schemes. We will explore a look how to use numerical methods in options pricing and explore the building of implied volatility models using market prices of options.

We will explore some code examples and techniques during the first lecture and we will code a full example during the second lecture.

Readings:

- Chapter 4: Text2

Assignment:

- A programming assignment to build option pricing models, and exercises on using scipy root finding functions will be assigned.

Week 11: Interest Rates and Derivatives

We will now move to discussing interest rate and derivative pricing with Python. The discussion will primarily focus on the bootstrapping the yield curve and present various short rate models that will apply to the pricing of the interest rate derivatives. We will use Python to illustrate various examples.

Readings:
- Chapter 5: Text2

Assignment:
- A programming assignment to build a derivative pricing model will be assigned.

Week 12: Big Data and Machine Learning in Finance

The discussion will be an introduction to big data demonstrations of tools – mainly Hadoop, and the Map-Reduce MR algorithm and related platforms. We will also discuss some of the financial applications of Big Data.

Readings:

- Chapter 7: Text2

Week 13: Big Data and Machine Learning in Finance

Machine learning is very fast growing in many industry domains and finance is no exception. We will look at some of the very basic concepts of machine learning and supporting platforms such as Pandas, Tensorflow and Keras, and some examples of how to apply these tools and platforms in finance. We will explore using machine learning techniques in derivative pricing.

Readings:

- Supplementary materials will be posted.
- Tensorflow
- Keras

Week 14: Algorithmic Trading

We will discuss algorithmic trading as a system driven process to execute equity trading orders at best possible price and how to use some broker published APIs (Application Programming Interfaces).. This will be a detailed discussion with code examples of how to use Python to develop live trading system algorithms using Python and the API of a broker.

Readings:
- Chapter 8: Text2

9

Assignment:

- A programming assignment to access a published brokerage firm API to construct your own trading system functions will be assigned.

Week 15: Backtesting

We will finish the course with a discussion of how to design and build backtesting systems to evaluate the performance of trading strategy and portfolios. We will code an example that illustrates this concept and discuss some more advanced techniques of how we could further this methodology.

Readings:

Chapter 9: Text2

Topics

- ✓ An Overview of Computers and Programming Languages
- ✓ Basic Elements of Python
- ✓ Creating a Python Program
- ✓ Input/Output
- ✓ Control Structures
- ✓ User Defined Functions
- ✓ User Defined Simple Data Types
- ✓ Arrays and Strings
- ✓ Objects Oriented Programming
- ✓ Recursion
- ✓ Searching and Sorting
- ✓ Linearity in finance
- ✓ Non Linearity in finance
- ✓ Numerical Procedures
- ✓ Interest Rates and Derivatives
- ✓ Trading Algorithms and Systems
- ✓ Backsetting
- ✓ Big Data and Machine Learning financial algorithms
- ✓ As time permits, we will have some basic coverage of data structures such as linked lists and stacks as an advanced topic

Projects and Assignments

Students are expected to complete assignments and projects that involve the use of Python 3.x to solve and code problems in a variety of topics such as business, math, science, finance, data, and games. More focus will be directed at FinTech problems.

Grading

Assignments and Projects	30%
Midterm:	30%
Final Exam:	30%
Class Participation	10%

(While unlikely, I reserve the right to adjust this allocation during the semester – depending on how well the class does with assignments over exams. Some assignment grades may be linked to the exam grade, and I may give quizzes on assignments that will inform you assignment grade).

Grading Policy

➢ All assignments are due on the date specified in the assignment.
➢ Programs must be submitted by MIDNIGHT of the due date.
➢ Programs must be accessible to the professor to be graded.
➢ A late assignment will accrue a 25% loss for every day late (this starts immediately after the due date/time has elapsed).
➢ Generally speaking, Makeup assignments or exams will not be considered. Exceptions may be considered in documented and VERY exceptional circumstances as explained below.
➢ The University policies on Incompletes will be strictly followed.
➢ The University policies on plagiarism will be strictly followed.
➢ All assignments/exams are individual assignments unless otherwise specified.

Attendance Policy

__Attendance is mandatory__, and I will be taking attendance. I am usually very flexible on many aspects of teaching and circumstances, but it is extremely important that you attend class. While the topics we will cover are in the book, in the reference materials, and in the notes I will post, the class coverage is extremely important and will enable you to work on the assignments.

Class/Course Policies and Instructions

✓ Please make sure you come to class on time.
✓ Please pay attention in class – it is important.
✓ I will post the code we do from class if any.
✓ Please come prepared. It will help you understand the materials.
✓ If a class is cancelled I will arrange for a makeup session.
✓ If you have questions, please ask. I am here to help you. You can email me (or call if necessary (I normally don't mind students calling my mobile when the class size is manageable. Let us use email unless it is absolutely necessary). Please don't hesitate to ask any questions even if

they seem simple. It is important to me that you understand the materials and that you are able to build up your programming skills.

✓ Please don't delay studying the materials and try to stay ahead of me by being prepared for class. You will not be able to get all the concepts if you cram a day or two before the exam or before you start on an assignment or a project.

✓ Please start your assignment and project on the day it is assigned. Don't delay. These are not tasks you could do last minute. If you start early, you will get it done. If you delay, you will not be able to finish.

✓ Your code must compile, and it must work as specified in the assignment or the project instructions. 50% of the grade for assignments and projects will be based on the fact that your code compiles and works according to the specifications given. Partial credit will be given of course to your attempting the assignment or project, but please remember that 50% is at stake if your code does not work as specified. Also, if instructions are specific, please follow the instructions. The code must be your own code. Please remember that your instructor has

✓ access to search engines, and can find copied code. This is not to say, however, that you can't re-use certain components when appropriate. For example, we may reuse predefined classes (this is the idea of OOP). But the code you write on how to use these components in your program must be yours. Please make sure you come up with your own logic for algorithmic implementations and user defined functions.

✓ Don't ever share your code with your classmates. If I see that the code for an assignment is similar to that of another student, both students will receive a zero and I may very well trigger Honor Code rules and procedures.

✓ The exams are mostly IN CLASS and CLOSED BOOK unless we arrange differently. **NO DEVICES ARE ALLOWED IN EXAMS (NO PHONES, NO SMART WATCHES, NO GOOGLE GLASSES, NO DEVICES PERIOD – I MEAN IT).**

✓ No exam makeup will be permitted unless you have evidence for a medical reason or an emergency. If possible, I will give the make up before the scheduled date of the exam.

✓ Assignments may vary in weight – I will specify. *Some of the assignments may build up to larger later assignments.* This is important to note – because you will save yourself so much time on the later assignments or projects by getting your earlier assignments done correctly.

✓ When appropriate, I will give you the opportunity to make up lost credit on assignments and the project by assigning extra credit components. You can take advantage of those to collect extra points.

✓ For those of you who are enrolled in the class and looking for a much larger amount of coding, please speak with me and we will make an arrangement, or you could register for a directed study in the FALL if offered.

Standard Grading will be followed, but I may adjust it based on a curve.

Lab Assistant: A Lab Assistant may be assigned to your course. The lab is for you to get help or ask question – but the LA will not solve the assignments for you. More details will be provided shortly.
Classroom Decorum
Please familiarize yourself with the University of Miami policy on classroom decorum in *Student Rights and Responsibilities Handbook.*
You will be asked to leave the classroom for the following reasons:

- Having the cell phone ringer go off and taking calls. Please have your cell phone in "vibrate" mode. Only emergency notices are to be answered.
- Talking during class - it is very disruptive – will not allow it.
- Attending to matters that are not directly related to this course (e.g., reading the newspaper, sleeping, surfing the Web, texting/instant messaging, playing games, checking email, attending to assignments of another course, etc.).
- *The rule is laptops down unless you are really taking notes or coding with me. If I see you doing something not related to class, you will be asked to leave the classroom. Each incident will cost you half a letter grade.*

IDE

Generally, software developers do their development work in some sort of "integrated development environment" (IDE), which will have many built-in tools for editing, compiling, running, and debugging programs.

For Python, you can use any of the IDEs that are out there (You must have Python installed on your system though). PyCharm, Code Runner, Sublime, etc. You can also use IDLE which ships with MacPython.

For Mac, install Python 3.x

https://docs.python.org/3/using/mac.html#ide

https://docs.python.org/3/using/mac.html

For Windows – you also need to install and configure the environment for Python 3.x:

https://docs.python.org/3/using/windows.html

I am looking forward to meeting all of you and an enjoyable semester. Good luck with the course.

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UNIVERSIY OF MIAMI
MIAMI BUSINESS SCHOOL

BTE 422: Technology Foundations of FinTech

Semester: Fall 2019
Section: TBA Class Hours: TBA
Credits: 3

Classroom: TBA

Instructor: Tarek Sayed
Office Location: Jenkins 423E
Office Hours: By appointment.

Telephone: 305.284.4316
E-mail: tarek@miami.edu
Fax: 305.284.5161

Course Prerequisites/Corequisites:
Prerequisites: None.

Course Description:

This course is an introduction to the application of technology in Finance (FinTech). The course is an overview course covering multiple disciplines of technology and how they are individually and collectively applied in financial systems, transactions, payments, and data lifecycles. The course aims to develop a student's understanding of key technological components such as cloud computing, Internet of Things(IoT), Big Data and Machine Learning, Artificial Intelligence, Blockchain technologies and data security and privacy as they relate to financial transactions, financial institutions, public and private business entities, governments, regulations and an overall monetary system. The course will explore financial solutions such as payment systems and mobile payment platforms, banking systems, predictive analytics, very fast analytics in trading systems, big data and fraud detection, smart contracts, International payment and remittance systems, and crowdfunding systems. The course will also attach importance to the regulatory frameworks and constraints governing financial systems and transactions and how such regulatory schemes protect consumers and monetary systems and how they could affect or even dictate aspects of technical architectures and platforms.

The course will enable a student explore such individual technology topics with a hands-on approach where the student would work on small assignments related to each topic. A final project will enable a student to utilize one or more technological components to enable a financial function.

Learning Objectives:

By the end of the course, the student will have gained significant broad knowledge across the technology domain – when combined with finance training will help the student operate and innovate within the financial ecosystem that is highly dependent on technology and is a prime consumer of today's technological advancements.

By the end of the course the students would have acquired:

1- A broad knowledge of many technology topics – this is important for the reason that many students who would take this course (even those with technology background or majors/minors) don't necessarily have such breadth to be able to think of larger impactful solutions in the finance space. Follow up studies would enable the student to go deeper.
2- Will acquire the foundational skills to be a finance technologist.
3- Will have basic understanding of the following technologies and knowledge of the development tools and infrastructure necessary to develop, deploy and operate such systems:
   a. Cloud Computing
   b. IoT
   c. Databases and Business Intelligence
   d. Machine Learning and Deep Learning
   e. Artificial Intelligence
   f. Blockchain
   g. Privacy and Security
4- Will acquire exposure to a wide array of business and financial scenarios and use cases of such technologies.

IMPORTANT COURSE POLICIES:
CLASSROOM CONDUCT POLICY*
SCHOOL OF BUSINESS ADMINISTRATION

The following are policies students should assume are in force in the School of Business Administration courses, unless their instructors explicitly establish alternate policies.
Laptops, Cell Phones, Smartphones, PDAs and Other Electronic Devices (such as recording equipment) may not be used during class except at the express discretion of the instructor.
Attendance
Each student is required to attend every class and attendance will be part of the grade. Faculty will excuse absences only in cases of documented serious illness, religious observance, civic obligation or participation in an activity approved by the Academic Deans Policy Council. Otherwise your attendance is expected. If you will miss class for religious observance or a civic obligation, you must inform your instructor at least one week in advance.
Any other absences such as absences for work related travel, or family emergency may be excused at the discretion of the faculty upon receiving supporting documentation. It is the student's responsibility to contact the instructor within one week after any unanticipated absence. Instructors and administrators shall endeavor not to schedule any examination or other graded class event on a major religious holy day.
Arriving Late, Leaving Early, Coming & Going
Classes start on time and students must arrive to class on time and stay to the end of the class period. Students may enter class late only if given permission by the instructor, and only if they can do so without disrupting the class. In addition,
• Students may not leave and re-enter the class once class has started except by permission from the instructor, and only if they can do so without disrupting the class.
• Arriving late or leaving class early will have impact on the course grade as determined by the instructor.
Please note that instructors are not obligated to admit late students or may choose to admit them only at specific times. Instructors are not obligated to readmit students who leave class.

Late Submission of Assignments

Late assignments will either not be accepted or will incur a grade penalty unless they are due to documented serious illness or a family emergency. Instructors may make exceptions to this policy for reasons of religious observance or civic obligation, only when the assignment cannot reasonably be completed prior to the due date and the student makes arrangements for late submission with the instructor in advance.

General Behavior

Students will conduct themselves with respect and professionalism toward faculty, students, and others present in class and will follow the rules prescribed by the instructor for classroom behavior. Students who fail to do so may be asked to leave the classroom with a grade penalty.

Collaboration on Graded Assignments

Students may not work together on graded assignments unless the instructor gives express permission or unless explicitly indicated on the course syllabus.

*Endorsed by the Vice Deans and Department Chairs

Disabilities Information

Accommodations for disabilities will only be given to students who have secured the proper documentation from UM's Office for Student Disabilities. Such documentation must be provided to the instructor within the first two weeks of the start of class. Students should contact the Office of Disabilities to secure appropriate accommodations.

Textbook and Materials

1- The FINTECH Book: The Financial Technology Ha… (Paperback)by Susanne Chishti, Janos Barberis. (Text1)
2- Fintech and the Remaking of Financial Institutions Academic Press 2018 (Available in Paperback) by John Hill (Text2)
3- Bitcoin: A Peer-to-Peer Electronic Cash System, Satoshi Nakamoto , https://bitcoin.org/bitcoin.pdf (Satoshi Paper).
4- Understanding Bitcoin: Cryptography, Engineering and Economics, Pedro Franco, https://www.wiley.com/en-us/Understanding+Bitcoin%3A+Cryptography%2C+Engineering+and+Economics-p-9781119019169 (Text3)
5- Blockchain Applications: A Hands-On Approach (Paperback)by Arshdeep Bahga, Vijay Madisetti (Text4)
6- Blockchain Technologies, https://scet.berkeley.edu/wp-content/uploads/BlockchainPaper.pdf (Berkeley Paper)

Course Schedule

Week 1: Introduction

The landscape of the finance industry is changing rapidly, in lecture one we will examine how technology is impacting this change. The lecture will cover the basic concepts of emergent technologies such cloud, distributed computing, mobility, crypto currencies and of Blockchain. We will discuss their inter connectivity and disruptive power within the context of finance.

Readings:
- Everything you needed to know about fintech (cnbc article)
- Chapter 1: "Introduction" ➜ Text1
- Chapter 1: "Introduction" ➜ Text2

Week 2: Technology the Disruptive Force

In this lecture we will delve deeper into the technologies that are capable of disrupting the product offerings and services provided by incumbent organizations in the financial industry. Topics will include: Mobile computing; cloud computing; AI including machine and deep learning; blockchain, and potential future technologies such as quantum computing.

Readings:
- Chapter 2: "Disruption and Disintermediation in Financial Products and Services: Why Now?" ➜ Text2

Week 3: A New Money System

Having looked at the basic building blocks of the technologies capable of disrupting the financial services industry we need to understand the new mechanisms in which these distributed and innovative systems are being funded and payed for beyond Fiat currencies. These are the emergent virtual currencies that enable a distributed pay-for-service environment to be established e.g., Bitcoin, Lite Coin and Ether

Building upon this background survey, we will discuss the basic premise of crypto currencies as a basis for economic activity, as a store of value, and their effect on the monetary system. This will lead us into a discussion of governance, legal frameworks, and regulations as applicable to a virtual currency monetary system.

Readings:
- Chapter 2: "Disruption and Disintermediation in Financial Products and Services: Why Now?" ➜ Text2

Week 4: Cloud Computing

The Fintech value proposition is in large part based on universally available seamless delivery of services. In order for this to be possible the connectivity of participants via a network and compute environment is the pre-requisite. This is facilitated by the internet itself and cloud services.

In this lecture we will examine the foundations of the cloud compute model, examining IaaS, PaaS and SaaS models. We will address questions such as: What is the role, function, and cost basis of these cloud models; what are the components of the AWS, Azure, and IBM Cloud models. The provisioning of cloud environments will be undertaken.

Readings:
* How Cloud Computing Benefits Fintech Companies?
* Scopes and Impact of Cloud Computing on Banking & FinTech
* 5 CLOUD COMPUTING TRENDS SHAPING THE FINTECH COMMUNITY

Week 5: FinTech in the Cloud

Having examined the basis of cloud compute in Week 4 we will examine the Fintech value proposition through this lens. We will examine questions such as: What are the aspects of the cloud environment that facilitate new services and products within the finance domain.

In this lecture we will explore cloud computing and gain an understanding of how to develop, deploy and operate applications in the cloud. Students will undertake the provisioning of their own cloud services on Google Cloud, AWS, Azure, or an IBM Cloud.

Readings:
* Cloud Adoption in Financial Services

Week 6: Introduction to Blockchain

With an understanding of networks and cloud compute environments, we will commence our investigation into the technologies associated with what has become termed the blockchain. Blockchain is a mechanism for the creation of file structures using unique pointer based technology known as a one way hash, the hash themselves being created from the contents of the data in the block and a cryptographic function. The mechanisms for the creation of such a block chain "public ledger system' will be considered:

These technologies will be considered in light of application domains such as title insurance, inventory tracking, and payment systems.

Readings:
* BlockChain Technology: Beyond Bitcoin
* https://scet.berkeley.edu/wp-content/uploads/BlockchainPaper.pdf
* Chapter 1 "Foundations" ➜ Text4
* Chapter 2 "Technologies" ➜ Text4

Week 7: MIDTERM EXAMINATION

Week 8: Introduction to Blockchain Technology

With an understanding of the blockchain concept from Week 6, we will now undertake a deeper dive into the underlying technologies upon which the block chain is fabricated. This includes the blockchain stack, the mechanisms of the centralized stack, the addressing and transaction systems, cryptographic algorithms, hashing algorithms, digital wallets and an overview of the programming languages used in the construction of these data structures.

Readings:
- Chapter 5 "Public key Cryptography" ➜ Text4
- Chapter 6 "Transactions" ➜ Text4
- Chapter 7 "Wallets" ➜ Text4

Week 9: Blockchain Technology & Smart Contracts

In this lecture we extend the concept of the blockchain beyond transaction logging to incorporate the basis of contractual relationships embedded into a blockchain and its technological framework. The class will be used to illustrate the idea of a "smart" contract, the development tools through which this is created and extended to incorporate a discussion of the problems-challenges of this paradigm from a technical-legal perspective. An overview of the Solidarity development framework will be discussed. Solidity is a high level programming language for contact implementation, it is influenced by languages such as Python, Java Script, and C++, as such it is statically typed, supports libraries, inheritance, and complex typing. The Etherium VM will also be examined.

Readings:
- https://www.isda.org/a/6EKDE/smart-contracts-and-distributed-ledger-a-legal-perspective.pdf
- https://solidity.readthedocs.io/en/v0.4.25/
- https://media.readthedocs.org/pdf/solidity/develop/solidity.pdf

Week 10: Internet of Things

The ability to collect data from IP devices is the basis of what is commonly termed the internet of things. The growth of this technology is predicted to be in the range of over 50 billion devices by 2020, as such the data collected off these will provide the basis for financial decision making with an increased scale of data collection and precision. This class examines this technology, the data collection mechanisms, and an introduction to its processing.

Readings:
- The "Fin"-ternet of Things: How IoT affects Financial Services
- Top 8 IoT Solutions for Fintech Providers (and How to Develop One)

Week 11: Foundations of Machine Learning

Big Data can be considered the outflow of enterprise systems but increasingly IoT devices, this when captured and manipulated within a cloud environment incorporating distributed compute enables new forms of analysis to be undertaken. The technical basis for much of this analysis is known as machine learning. In this week's class we discuss an overview of these topics through a FinTech lens and work to gain a high level understanding of the technologies upon which they operate; including coding examples in Python, Sage Maker, Azure ML, Deep Learning and Watson.

Readings:

- Machine learning to enhance FinTech
- Class materials for ML application development will be passed around
- https://aws.amazon.com/sagemaker/

Week 12: Machine Learning in FinTech

The financial industry has for a long time recognized the power of data in decision making, and analysis of that data is key to competitive advantage and better decision making. In this class we continue our exploration of ML technologies through the lens of FinTech, exploring topics including Deep Learning and the Panda software library that enables data manipulation and analysis to be undertaken within the Python programming language.

Readings:

- Coding Examples with Large financial data sets.
- http://pandas.pydata.org/pandas-docs/stable/

Week 13: Distributed Machine Learning in FinTech

The data processing requirements in big data and are for most situations in excess of what can be performed on traditional platforms and as such require distributed processing platforms. To enable this to be executed new programming technologies and systems have been created. In this lecture we will undertake an overview of these technologies including Hadoop, Spark, Pig,

and Hive.

Readings:

- Slides for Hadoop/Spark will be provided from Cloudera.
- https://www.cloudera.com/

Week 14: Fundamentals of Artificial Intelligence

The ML theory has its origins in the world of AI having been part of the work of McCulloch-Pitts who in 1941 originated the artificial neuron, this led to interest in automata theory, and Computer Science legends such as Alan Turning investigated this topic for cryptographic purposes before moving into the world of AI. In this lecture we will develop the time line of AI from its origins and illustrate how topics such as Neural Networks, Natural Language Processing, voice recognition, predictive analytics, and machine learning systems are embedded into the applications used in the finance and service industries. The platforms and vendors that support these tools and systems will be discussed.

Readings:

- https://medium.com/@oleksii_kh/ai-in-fintech-10-trends-to-follow-this-year-f14fc0461240
- https://www.netguru.co/blog/ai-and-machine-learning-in-fintech.-five-areas-which-artificial-intelligence-will-change-for-good

Week 15: Fundamentals of FinTech Security Systems

The financial industry requires that the technologies utilizes incorporates the most advanced and 'aware' defensive capabilities that are available. In this class we will examine cyber security and mechanisms for its deployment. Topics covered include: security and privacy, laws and regulations that focus on the finance and banking industries.

Readings:

- https://www.information-age.com/cyber-security-challenges-emerging-fintech-startups-123471506/

Class Materials will be provided

Projects and Assignments

Midterm: 40 points
Final Exam: 60 Points

Homework: Each week (weeks 2 – 6 and 8 – 15) a one page paper will be due based upon a set of questions provided by the instructor. Students are expected to complete this assignment prior to class. 130 Points

Term Paper: A research paper on a topic related to the course work will be assigned. This is intended to be completed by a group of students, group size no greater than 4 students. For the final project, a list of projects will be provided and the student may choose one of the projects, or the student may come up with her own project but must be approved by the instructor. 100 points

Total Points: 330

FIN 410 - Financial Institutions and Markets

Tentative Syllabus Fall 2019

Course Website: FIN 410 on Blackboard

Instructor: Paulo Leme   Miami Business School, 314-B Jenkins Building
email: paulo.leme@bus.miami.edu

Course Objectives
This course will familiarize the student with the main institutions of the global financial system, including global financial architecture and the regulatory framework for financial institutions. The course discusses how central banks conduct monetary policy, set interest rates and oversee the creation of credit. The course explains the determinants of and the term structure of interest rates, and how fiscal policy affect bond markets and yields. The course analyzes how fixed income markets work and presents the concepts of convexity, duration and immunization of bond portfolios. The course teaches the mandates and functioning of depository institutions (commercial banks, credit unions) and investment banks. The course introduces basic portfolio management concepts and applies them to understand the busines models and economics of investment companies (mutual funds, ETFs, pension funds and hedge funds) and insurance companies. The course introduces the principals of risk management for financial institutions, with emphasis on market, credit, liquidity, and operational risks. Value at Risk (VaR) models: definition, measurement, models, practical applications in banks, and limitations. Stress testing, Scenario Analysis and CCAR.

Prerequisites
FIN 302 (Fundamentals of Finance) and FIN 320 (Investments and Security Markets)

Textbook
Financial Markets and Institutions (FMI), McGraw Hill, 7th edition (©2019)
Authors: Anthony Saunders and Marcia Cornett
Recommend using Berk and DeMarzo (Corporate Finance), the Core: chapters 11, 12, and 13 for CAPM, Beta, Sharpe Ratio, and Alpha

Office Hours
Mondays 4:30 pm - 6:30 pm

Honor Code
All students must comply with the University of Miami policies for conduct and academic honesty at all times during this course. Any violations of these policies will result in referral to the appropriate administrative body.

Attendance and Participation
You are expected to attend all lectures. Please check with me in case you have to miss a class. The finance department requires you to attend at least 80% of the classes to receive a passing grade. I encourage you to actively participate in class.

Special Accommodations
If you need an accommodation for a disability, please let me know at your earliest convenience. Some aspects of the course, the assignments and the in-class activities may be modified to facilitate your participation.

Classroom Etiquette

Feel free to use computers, tablets, and calculators during class, but please do not use smartphones. During exams you are only allowed to use a calculator.

Preparation for Class

I recommend that before each class you read the assigned chapters from Saunders. Check Blackboard for announcements and all the course notes.

Grading Policy (preliminary)
- Maximum possible score: 100
- Midterm 1: 25%
- Midterm 2: 25%
- Final Exam: 40%
- Participation in class: 10%

Tentative Course Schedule (as of November 19, 2018)

Class	Topic	Reading	Date
1	Overview of financial markets	Saunders 1	
2	Central Banks: creation of money and credit	Saunders 4	
3	Monetary policy and determination of interest rates Open Market Operations, reserve requirements, discount window and quantitative easing (QE)	Saunders 2 Class notes	
4	International financial architecture (IMF, BIS, Financial Stability Forum, SEC, CTFC, FINRA, NFA). Basel III (risk weighted capital ratios: CET1, Tier 1 and leverage ratios, counter-cyclical buffers, capital surcharge for G-SIBs), Dodd-Frank, Volcker, Sarbanes-Oxley	Saunders 13 Class notes	
5	Determination of interest rates and term structure of interest rates	Saunders 2, 3	
6	Interest rates and the valuation of bonds and equities	Saunders 3	
7	Bond valuation, bond yields, yield to maturity	Saunders 3	
8	Convexity, duration and immunization of bond portfolios	Saunders 3	
9	**FIRST MIDTERM**		
10	Fiscal policy and its effects on economic activity, interest rates and bond markets	Class notes	
11	Money markets	Saunders 5	

12	Primary and secondary bond markets Debt underwriting and pricing primary issue Equity underwriting and deal pricing	Saunders 6	
13	Mortgages - primary and secondary markets and securitization of mortgage products	Saunders 7	
14	Depository Institutions - Commercial Banks (introduction)	Saunders 11	
15	Commercial banks - economics and analysis of financial statements. Off-balance sheet operations. Loan portfolios, NPL, losses, provisioning, securitization of loan portfolios Regulation and supervision of banks: application of Basel III ratios, CAMELS	Saunders 12, 13	
16	Other lending institutions (credit unions, finance companies, and fintech)	Saunders 14	
17	Insurance companies	Saunders 15	
18	**SECOND MIDTERM**		
19	The Sell Side - Investment Banks Business model and management	Saunders 16	
20	Investment banks - analysis of financial statements and effects of regulation	Saunders 15	
21	Portfolio theory: capital asset pricing model, Betas, Sharpe ratio, and creating Alpha Active versus passive investing	Berk DeMarzo 11, 12, 13	
22	The Buy Side - Investment Companies Open-end, Closed-end, and unit investment funds	Saunders 17	
23	Mutual Funds, NAVs and Pension Funds	Saunders 17 and 18 Class notes	
24	ETFs and Hedge Funds: business models	Class notes	
25	Risk management: market risk, credit & counterparty risk, operational risk, liquidity risk	Saunders 19	
26	Managing credit risk on the balance sheet. Credit quality problems, scoring models, liquidity and solvency ratios, and interest rate sensitivity of bank portfolios	Saunders 21	
27	VaR: definition, measurement, models, practical applications in banks, and limitations.	Class notes	
28	Stress testing, Scenario analysis and CCAR.	Class notes	
	FINAL EXAM		