

Master Programme Course Selection Summer Semester 2022

Please note that this module catalogue is subject to change (course offer, module descriptions).
As an exchange student, you are able to choose up to **5 courses**. Every module at Frankfurt School is worth **6 ECTS**.

You should choose courses from one program only: MiM or MoF or MADS* or from the Electives. **Upon request, we can offer you to choose one program per quarter**, for example: Electives in Q3, MADS in Q4; or MoF in Q3 and MiM in Q4. In this case, please send us your personal request **by 19 November 2021**. We will check if this is possible and if yes, will have to book you manually to some courses.

Module offerings and availability of places are **subject to change**, no guarantees may be given.
Seats in some modules are limited – first come, first served!

- Please check carefully **the requirements of each course** in the module description to make sure that you have the level / background to attend it!

**MiM = Master in Management, MoF = Master of Finance, MADS= Master of Applied Data Sciences*

Quarter Schedules – MoF, MiM, MADS

Quarter 3:	Academic period:	17 January – 19 March 2022
	Exam Week:	21 March – 26 March 2022
Quarter 4:	Academic period:	04 April – 21 May 2021
	Exam Week:	23 May – 30 May 2021

Master of Finance (MoF)

Data Analytics & Machine Learning in Finance	Q3
Corporate Finance & Valuation	Q3
Risk Management	Q3
Advanced Corporate Valuation	Q4
Financial Markets & Institutions	Q4
Risk Governance & Organization	Q4

Master in Management (MiM)

Strategic Management	Q3
Leadership	Q3
Innovation Management & New Product Development	Q3

MiM Concentrations

Global Strategy

Corporate Finance and Governance*	Q4
Operations Strategy	Q4

People, Management and Organizations

Managerial Decision Making	Q4
Power, Politics, and Social Networks*	Q4

Data & Business Analytics

Optimization & Decision Models*	Q4
Designing and Analysing Business Experiments	Q4

** The module description of those courses will not be available before January 2022. You can find a short overview of the course content in this catalogue.*

Master of Applied Data Sciences (MADS)

Guided Studies in Financial Management	Q3
Machine Learning 1	Q3
Machine Learning 2	Q4
AI & Humanity – the ethics of data science	Q4

Electives

Quarter Schedules – Electives

Quarter 3:	Academic period:	31 January – 19 March 2022
	Exam Week:	28 March – 02 April 2022
Quarter 4:	Academic period:	04 April – 21 May 2021
	Exam Week:	23 May – 30 May 2021

Please note that not all elective modules are compatible with each other – see table below. In order to avoid clashes, the online platform will not allow you to choose incompatible modules.

Name	Dedicated programme(s)	Quarter	Remark	Incompatibilities
Bank Controlling & Treasury	MoF Finance Guest Students only	Q3	Blockweek	Numerical Analysis of Dynamical systems
FX Options & Structured Products	MoF Finance Guest Students only	Q3	Blockweek	Strategic Business Modelling, Numerical Analysis of Dynamical systems, Insights into Manufacturing Industry
Insights into Manufacturing Industry	MiM	Q3		FX Options & Structured Products, Strategic Business Modelling, Numerical Analysis of Dynamical systems, Design and Management of Hierarchies, Renewable Energy
Numerical Analysis of Dynamical systems	MADS	Q3		FX Options & Structured Products, Strategic Business Modelling, Bank Controlling & Treasury, Insights into Manufacturing Industry, Design & Management of Hierarchies

Quantitative Trading and Analysis with Python	MoF If you want to apply for this course, please write us before the course selection as it requires an advanced python level! We will need to check your profile before.	Q3		Renewable Energy Finance, Design and Management of Hierarchies
Renewable Energy Finance	MADS/MiM/MoF	Q3	Blockweek	Insights into Manufacturing Industry, Quantitative Trading and Analysis with Python
Strategic Business Modelling	MADS/MiM/MoF	Q3	Blockweek	FX Options & Structured Products, Numerical Analysis of Dynamical systems, Insights into Manufacturing Industry
Design and Management of Hierarchies	MADS/MiM/MoF	Q3	Blockweek	Insights into Manufacturing Industry, Numerical Analysis of Dynamical systems, Quantitative Trading and Analysis with Python
Advanced Mergers & Acquisitions	MiM/MoF	Q4	Blockweek	Intercultural Management
Applying Artificial Intelligence in Business (Online)	MADS/MiM/MoF	Q4	Blockweek	Intercultural Management
Intercultural Management	MADS/MiM/MoF	Q4		Advanced Mergers & Acquisitions, Applying Artificial Intelligence in Business
M&A Strategy by E&Y	MADS/MiM/MoF	Q4	Blockweek	Practical Data Science and Artificial Intelligence in Python
Practical Data Science and Artificial Intelligence in Python	MADS/MoF	Q4		M&A Strategy by E&Y

German language course: it is running for the full semester and thus takes place both in Q3 and in Q4. It is not possible to attend the language course only for one quarter. The final exam will take place at the end of Q4.

Master of Finance (MoF)

**Data Analytics and Machine Learning in
Finance [FIN72017]**

Modulkoordinator		Wheeler, Gregory			
Studiengang		MSc MF			
Studienabschnitt		Semester 2 Q3			
Moduldauer		1 Semester			
Pflicht- /Wahlpflichtmodul		Pflicht			
Credits:		6			
Häufigkeit des Angebots		Jährlich			
Sprache		Englisch			
Workload:	150 h	Präsenz:	44 h	Selbststudium:	106 h
Voraussetzungen für die Teilnahme		Statistics & Econometrics, Python			
Kurzbeschreibung / Lerninhalte		<p>Advanced data analytics employs techniques from machine learning and artificial intelligence to sift through large and even unstructured data to reveal patterns and identify trends to yield more accurate judgments and better-informed decisions. The aim of machine learning is to make a computer learn from data without explicitly programming it how to do so, and the fruits of machine learning are all around us: email spam filters classify your messages, postal services read and route billions of hand-written letters every month, online businesses recommend products to customers, and speech-to-text transcribers now match the accuracy of human transcribers opening the possibility of real-time language translation – all using contemporary machine learning techniques. Financial institutions increasingly apply these very same techniques to an expanding range of problems, leveraging an increasing volume of data through daily operations and third-party sources to manage portfolio risk, perform trades, detect fraud, comply with regulations, and much, much more.</p> <p>This course is a hands-on introduction to contemporary regression-based techniques in machine learning, with a focus on supervised learning algorithms (used to make accurate predictions about the future from current data) and unsupervised learning (used to discover unknown structure in your current data).</p> <p>Because applications in this field are fast moving, the focus of this course is to give students a working understanding of core ML techniques backed by a solid theoretical understanding of how these algorithms work.</p>			

<p>Qualifikationsziele / Lernergebnisse</p>	<p><i>Knowledge:</i> On the successful completion of this module, students will have a rudimentary understanding of regression-based techniques in machine learning, with a focus on supervised learning algorithms (used to make accurate predictions about the future from current data) and unsupervised learning (used to discover unknown structure in your current data).</p> <p><i>Skills:</i> Upon the successful completion of this module, students will have a hands-on experience implementing several core machine learning algorithms used in data analytics. Specifically, upon successful completion of the programming assignments for the course, students will have fully working implementations of</p> <ul style="list-style-type: none"> • Single and Univariate Regression models • Gradient Descent for multiple features • Logistic regression for multiple features • CART models • Time Series Analysis & Forecasting • A complete Neural Network, including implementations of a neural network cost function and back propagation for non-linear classification • K-means clustering <p><i>Competencies:</i> The course is designed to be a hands-on introduction to machine learning. To that end, students who successfully complete the course will be able to pursue two tracks:</p> <ul style="list-style-type: none"> • Students will have a rudimentary but working knowledge of how contemporary ML algorithms work, enabling them to be informed “citizen analysts” and to collaborate with data science teams. • Students without prior experience but with an interest to pursue studies in data science will be prepared to study an introduction to machine learning course in a computer science department or to follow one of several technical online courses in ML, statistics and data science. 												
<p>Lernformen, Methodik und Betreuung</p>	<p>The course will consist in theoretical lectures, where theory and programming tips are covered, and tutorials, where students will begin work on that week’s programming assignment, which will be completed outside of class.</p> <p>In addition to the Professor, there will the Teaching Assistants for the course available to help students.</p>												
<p>Art der Prüfungsleistungen im Modul und Akkumulationspunkte</p>	<table border="1" data-bbox="480 1753 1378 1995"> <thead> <tr> <th>Type of examination</th> <th>Duration or length</th> <th>Performance Points</th> <th>Due date or date of exam</th> </tr> </thead> <tbody> <tr> <td>Five (5) Programming Assignments</td> <td>tbd</td> <td>70</td> <td>During the module</td> </tr> <tr> <td>Written exam</td> <td>50 min</td> <td>50</td> <td>Written exam</td> </tr> </tbody> </table>	Type of examination	Duration or length	Performance Points	Due date or date of exam	Five (5) Programming Assignments	tbd	70	During the module	Written exam	50 min	50	Written exam
Type of examination	Duration or length	Performance Points	Due date or date of exam										
Five (5) Programming Assignments	tbd	70	During the module										
Written exam	50 min	50	Written exam										

Literaturhinweise	<p>We will use the following resources:</p> <ul style="list-style-type: none"> • Gregory Wheeler (2020) "Lecture Notes for Machine Learning." Available from the course website • Michael A. Nielsen (2015), Neural Networks and Deep Learning. Determination Press.Url: http://neuralnetworksanddeeplearning.com/ <p>In addition, for programming tips in Python, students may wish to consult</p> <ul style="list-style-type: none"> • Wes McKinney (2013), Python for Data Analysis. Sebastopol, CA: O'Reilly.
Modulstruktur	<p>The module structure consists of four components:</p> <ol style="list-style-type: none"> 1. Preparation for each lecture by reading the assigned material prior to class 2. Attend all tutorials with a laptop with all software installed and ready prior to class 3. Complete all programming assignments and submit them on-time and in the correct format 4. A final exam
Verwendbarkeit für andere Module und Programme	Subsequent modules in all concentrations
Letztes Freigabedatum	21.01.2020

Corporate Finance and Valuation

(previously called Corporate Finance [FIN72021])

Module Coordinator		Sautner, Zacharias			
Programme(s)		Master of Finance			
Term		Semester 1 Q2			
Module Duration		1 Semester			
Compulsory/Elective Module		Compulsory Module			
Credits:		6			
Frequency		Annually			
Language		English			
Total Workload	150 h	Academic Teaching Hours:	37	Remaining Workload:	Self-study
		Self-study includes lesson preparation and follow-up activities, reading assignments, assessment preparation, take-home assignments, etc.			
Prerequisites		Foundations of Finance, Macro- & Monetary Economics, Financial Statement Analysis			
Content		<p>The purpose of this module is to introduce techniques of financial analysis, with emphasis on the main topics in corporate finance. The concepts developed in this module form the foundation for all elective finance modules. The module focuses on concepts that can be applied directly to real-life financial decision making. The main topics covered include hurdle rates and the cost of capital (i.e., the investment decision), the mix of debt and equity and choosing the right kind of debt (i.e., the financing decisions), and the return of cash to shareholders (i.e., the dividend decision). There will be several studies complementing the module. The cases help to apply the acquired tools and concepts to real-world problems.</p> <p>Grading: The total grade will be determined by both individual and group activities. Details for group activities tbd depending on the lecture room situation.</p>			

Intended Learning Outcomes	<p><i>Knowledge:</i> On successful completion of this module, students will have an in-depth understanding of corporate finance and related topics, e.g. they can:</p> <ul style="list-style-type: none"> • Illustrate corporate governance mechanisms • Explain project and company valuation • Understand financing sources and capital structure theories <p><i>Skills:</i> On successful completion of this module, students will have the proven ability to apply the gained knowledge and studied methods to the corporate finance setting, e.g. they can:</p> <ul style="list-style-type: none"> • Estimate adequate hurdle rates for project decisions • Evaluate business opportunities • Choose the right type and amount of debt financing • Critically assessing corporate financial decisions <p><i>Competence:</i> On successful completion of this module, students can responsibly transfer these concepts to typical corporate finance situations, e.g. they can:</p> <ul style="list-style-type: none"> • Build corporate governance structures • Make educated capital budgeting and financing decisions 												
Forms of teaching, methods and support	Lectures & Case study discussions												
Type of Assessment(s) and performance	<table border="1" data-bbox="480 1182 1378 1424"> <thead> <tr> <th>Type of examination</th> <th>Duration or length</th> <th>Performance Points</th> <th>Due date or date of exam</th> </tr> </thead> <tbody> <tr> <td>Written Exam</td> <td>60 Min.</td> <td>60</td> <td>Exam week</td> </tr> <tr> <td>Presentation of academic article (group work)</td> <td>20 Min.</td> <td>60</td> <td>During module</td> </tr> </tbody> </table>	Type of examination	Duration or length	Performance Points	Due date or date of exam	Written Exam	60 Min.	60	Exam week	Presentation of academic article (group work)	20 Min.	60	During module
Type of examination	Duration or length	Performance Points	Due date or date of exam										
Written Exam	60 Min.	60	Exam week										
Presentation of academic article (group work)	20 Min.	60	During module										
Recommended Literature	Damodaran, A., Applied Corporate Finance, 4th ed., John Wiley & Sons												
Module Structure	<ul style="list-style-type: none"> • Objective of Corporate Finance • Corporate Governance • Cost of capital • Time weighted, incremental cash flow returns • From earnings to cash flows • NPV vs. IRR • Synergies in projects • Options in projects • Trade off on debt • Determinants of optimal debt ratio • Dividend policy • Valuation modeling in Excel • Investment banking cases 												

Usability in other Modules/Programmes	Subsequent modules in all concentrations; Master's Thesis
Last Approval Date	2020/08/31

Risk Management [FIN71030]

Modulkoordinator		Sannino, Francesco			
Studiengang		MSc MF			
Studienabschnitt		Semester 2			
Moduldauer		1 Semester			
Pflicht- /Wahlpflichtmodul		Pflicht			
Credits:		6			
Häufigkeit des Angebots		Jährlich			
Sprache		Englisch			
Workload:	150 h	Präsenz:	44 h	Selbststudium:	106 h
Voraussetzungen für die Teilnahme		Foundations of Finance, Statistics & Econometrics, Microsoft Excel			
Kurzbeschreibung / Lerninhalte		<ul style="list-style-type: none"> • Introduction (role of bank capital, overview of financial risk management) • Risk factors and risk mapping • Risk measures and Value-at-Risk • Market risk: Computing Value-at-Risk • Credit Risk and Credit Value-at-Risk • Economic capital and RAROC • Regulation and Basel II/II.2/III • Related topics and applications 			

Qualifikationsziele / Lernergebnisse	<p><i>Knowledge:</i> On successful completion of this module, students will have a thorough comprehension of the basic definitions, theories and concepts of risk management, i.e. they can:</p> <ul style="list-style-type: none"> • Explain how to manage and hedge trading book exposures • Summarize and discuss regulatory requirements • Validate how risk management supports to assure a bank's profitability <p><i>Skills:</i> On successful completion of this module, students will have the proven ability to apply risk measurement and risk management concepts for bank management purposes, i.e. they are able to:</p> <ul style="list-style-type: none"> • Calculate various risk measures • Evaluate the impact of risk on prices for financial products and services • Apply risk measurement and risk management concepts for bank management purposes • Design instruments for a bank-wide risk management <p><i>Competence:</i> On successful completion of this module, students recognise the importance of risk management in a financial institution and are capable of acting as the interface between risk managers and other bank departments</p>
Lernformen, Methodik und Betreuung	Lectures, in-class exercises, homework, case studies, presentations, written exam
Art der Prüfungsleistungen im Modul und Akkumulationspunkte	-
Literaturhinweise	<ul style="list-style-type: none"> • Hull, J.: Risk Management and Financial Institutions. Pearson Prentice Hall, 2007 <p>Additional literature will be given in class</p>

Modulstruktur	<p>The module covers the foundations of risk management, with a special focus on market risk and credit risk. The importance of risk management for capital management and bank governance is stressed. Several techniques for computing standard risk measures (PVBP, Value-at-Risk) are taught and applied. Risk-adjusted profitability measures such as RAROC are considered. Techniques for allocating capital to individual business units are presented. Finally, the course covers regulatory aspects with a focus on Basel II and market risk.</p> <p>The aim of the module is:</p> <ul style="list-style-type: none"> • To understand the importance of risk management in a bank/financial institution for regulatory purposes and for management purposes • To understand how financial products are used for hedging • To understand how risk is measured on a bank-wide level
Verwendbarkeit für andere Module und Programme	Subsequent modules in all Concentrations
Letztes Freigabedatum	26.01.2018

Advanced Corporate Valuation

Advanced Corporate Valuation [FIN74381]

Module Coordinator		Ecker, Frank			
Programme(s)		MSc MoF			
Term		Semester 3 Q1			
Module Duration		1 Semester			
Compulsory/Elective Module		Concentration Module			
Credits:		6			
Frequency		Annually			
Language		English			
Total Workload	150 h	Academic Teaching Hours:	44	Remaining Workload:	Self-study
		One academic teaching hour corresponds to 40 minutes.			
		Self-study includes lesson preparation and follow-up activities, reading assignments, assessment preparation, take-home assignments, etc.			
Prerequisites		Foundations of Finance, Financial Statement Analysis, Corporate Finance & Valuation			
Content		<ol style="list-style-type: none"> 1. Accounting basics: Relations between statements, ratio analyses, etc. 2. Recap of valuation basics: discount rates, etc. 3. Forecasting via pro-forma financial statements 4. Market-based (multiples) valuations 5. Free cash flow models 6. Accounting-based valuation models 7. Complexities in valuations: stock options, etc. 8. Steady state issues and remedies 			

<p>Intended Learning Outcomes</p>	<p><i>Knowledge:</i> On successful completion of this module, students will have an in-depth understanding of different valuation techniques, e.g., they will be able to:</p> <ul style="list-style-type: none"> • Explain the main concepts and techniques of firm valuation • Compare and contrast the applicability of different valuation techniques • Describe the different assumptions of valuation and their implications <p><i>Skills:</i> On successful completion of this module, students will have the ability to:</p> <ul style="list-style-type: none"> • Apply valuation models to real world situations • Make appropriate inferences from and critically evaluate valuation results <p><i>Competence:</i> On successful completion of this module, students can take responsibility to transfer the knowledge and practiced methods in corporate valuation to real world situations, e.g. they can:</p> <ul style="list-style-type: none"> • Prepare and critically assess corporate valuations • Demonstrate independent problem solving ability 															
<p>Forms of teaching, methods and support</p>	<p>Lectures, team-based case work and (final) valuation project</p>															
<p>Type of Assessment(s) and performance</p>	<table border="1"> <thead> <tr> <th data-bbox="480 1149 700 1227">Type of examination</th> <th data-bbox="700 1149 935 1227">Duration or length</th> <th data-bbox="935 1149 1155 1227">Performance Points</th> <th data-bbox="1155 1149 1375 1227">Due date or date of exam</th> </tr> </thead> <tbody> <tr> <td data-bbox="480 1227 700 1395">Valuation project (team)</td> <td data-bbox="700 1227 935 1395">~ 3 weeks overall</td> <td data-bbox="935 1227 1155 1395">30</td> <td data-bbox="1155 1227 1375 1395">During the module (Presentation during last class)</td> </tr> <tr> <td data-bbox="480 1395 700 1451">Written exam</td> <td data-bbox="700 1395 935 1451">90 min</td> <td data-bbox="935 1395 1155 1451">90</td> <td data-bbox="1155 1395 1375 1451">Exam week</td> </tr> </tbody> </table>				Type of examination	Duration or length	Performance Points	Due date or date of exam	Valuation project (team)	~ 3 weeks overall	30	During the module (Presentation during last class)	Written exam	90 min	90	Exam week
Type of examination	Duration or length	Performance Points	Due date or date of exam													
Valuation project (team)	~ 3 weeks overall	30	During the module (Presentation during last class)													
Written exam	90 min	90	Exam week													
<p>Recommended Literature</p>	<ul style="list-style-type: none"> • Koller, T., M. Goedhardt and D. Wessels (McKinsey): Valuation - Measuring and Managing the Value of Companies, 7th edition, Wiley Finance, 2020 <p>To refresh finance basics:</p> <ul style="list-style-type: none"> • Damodaran, A.: Applied Corporate Finance, 4th ed., John Wiley & Sons • Berk, J., and P. De Marzo: Corporate Finance, 4th ed., Pearson International 															

Module Structure	<p>This course focuses on the valuation of equity securities. The tools and techniques consist of preparation of pro-forma financial statements, estimation and forecasting of free cash flows and other valuation attributes, application of valuation models (e.g., discounted dividend, free cash flows, abnormal earnings and economic profit), and understanding of market-multiples valuation approaches (e.g., price-earnings ratios, EBITDA multiples, etc.). We will emphasize the role of financial statement data in equity valuation, using advanced problems and cases developed from and around actual financial statements.</p> <p>The course is intended to provide you with a strong theoretical and applied understanding of the key equity valuation and stock selection approaches used by financial managers, securities analysts, investment/portfolio managers and consultants. The links between, and the limitations of these approaches will be discussed, so that you gain an understanding of the appropriateness of the different methods in different situations.</p> <p>The material (readings, cases, exercises, etc.) is designed for students who have little or no background in securities analysis and valuation. I assume a basic understanding of financial accounting, finance, and regression analysis. I also expect you to be able to manipulate Excel spreadsheets and to collect data from various financial databases.</p> <p>The topics covered are intended to complement related courses in Accounting (such as Financial Statement Analysis) and Finance (such as Foundations in Finance and Corporate Finance). This course should prove beneficial for students planning careers in investment banking, portfolio management, corporate finance, (financial) consulting and security analysis.</p> <p>Evaluation: Throughout the semester, there will be non-graded cases that will help apply the acquired tools to real-world problems and guide some in-class discussions. Towards the end of the course, you will also be asked to prepare a final project in the form of a written analyst report, possibly accompanied by a brief presentation of the main findings (class size and time permitting), covering a stock or transaction of my choosing. The total grade will be determined by:</p> <ul style="list-style-type: none"> • Valuation project (team): 30 performance points • Final exam (individual): 90 performance points
Usability in other Modules/Programmes	Other modules in the Corporate Finance and Financial Advisory Concentration
Last Approval Date	2021/03/08

Financial Markets and Institutions [FIN72018]

Modulkoordinator		Fecht, Falko			
Studiengang		MSc MF			
Studienabschnitt		Semester 2 Q4			
Moduldauer		1 Semester			
Pflicht- /Wahlpflichtmodul		Pflicht			
Credits:		6			
Häufigkeit des Angebots		Jährlich			
Sprache		Englisch			
Workload:	150 h	Präsenz:	44 h	Selbststudium:	106 h
Voraussetzungen für die Teilnahme		Other core modules			

<p>Kurzbeschreibung / Lerninhalte</p>	<p>This course deals with the economic role of different financial institutions.</p> <p>In the first part we will focus on traditional banks. We will discuss frictions in financial markets that allows banks to add value as an intermediary. We will also analyse how banks add value in mitigating these market frictions. Based on these insights we will study why banks are fragile and affected by financial contagion. This permits us then to assess thoroughly how the government in general can alleviate the consequences of financial crises. For instance, we will study how the central bank can act as a lender of last resort to prevent liquidity crises. Furthermore, we evaluate different measures to assess and strengthen the resilience of financial institutions, such as capital and liquidity regulation and stress testing. In this regards, we will also discuss how the European banking union affects the Euro area's financial system.</p> <p>The second part is devoted to other financial intermediaries. Here we will first discuss the shadow banking sector in general. We will analyse how the shadow banking sector, in contrast to traditional banks, channels funds from savers to borrowers and which financial institutions are involved in this process. We will study how the different entities of the shadow banking sector help mitigate financial market frictions and add value. Besides this we will also learn about the risks inherent in the shadow banking sector and discuss mechanisms that can lead to financial contagion among these financial institutions.</p> <p>Finally, we analyse how financial innovations change banks' business models and how they change the interplay between banks and other financial institutions, in particular shadow banks and FinTechs. ---</p>
<p>Qualifikationsziele / Lernergebnisse</p>	<p>Upon completion of the course, students have a solid understanding of the role of different financial institutions and of the key drivers of structural changes in the financial sector. They are able to evaluate how financial institutions are affected by a changing environment. More specifically, students have a thorough knowledge of threats to the stability of individual financial institutions and of mechanisms endangering the resilience of large parts of the financial system. In addition, students understand the reasons for financial regulations enabling them also to assess the consequences of regulatory changes for the financial industry.</p>
<p>Lernformen, Methodik und Betreuung</p>	<ul style="list-style-type: none"> • Lecture • In-class exercises • Case studies • Student presentations

Art der Prüfungsleistungen im Modul und Akkumulationspunkte	<table border="1" data-bbox="480 371 1378 616"> <thead> <tr> <th>Type of examination</th> <th>Duration or length</th> <th>Performance Points</th> <th>Due date or date of exam</th> </tr> </thead> <tbody> <tr> <td>Case study (paper and presentation):</td> <td>tbd</td> <td>60</td> <td>During the module</td> </tr> <tr> <td>Written exam</td> <td>60 minutes</td> <td>60</td> <td>Exam week</td> </tr> </tbody> </table> <ul style="list-style-type: none"> Type of examination Duration or length Performance Points Due date or date of exam Case study (paper and presentation): tbd 60 During the module Written exam 60 minutes 60 Exam week 	Type of examination	Duration or length	Performance Points	Due date or date of exam	Case study (paper and presentation):	tbd	60	During the module	Written exam	60 minutes	60	Exam week
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Case study (paper and presentation):	tbd	60	During the module										
Written exam	60 minutes	60	Exam week										
Literaturhinweise	<ul style="list-style-type: none"> Greenbaum, Stuart I. and Thakor, Anjan V. 2007. Contemporary Financial Intermediation, 2. edition, Academic Press, Parts I, II, III, V, & VI. European Central Bank. 2014. "Fire Sale Externalities." Financial Stability Report, November 2014, pages 99-109. Bakk-Simon, Klára, Stefano Borgioli, Celestino Giron, Hannah Sabine Hempell, Angela Maddaloni, Fabio Recine, and Simonetta Rosati (2012) Shadow banking in the Euro area: an overview, European Central Bank, Occasional paper 133. Morrison, A. D. and W. J. Wilhelm (2007) Investment Banking – Institutions, Politics, and Law, Oxford University Press. (especially chapters 1-3). Gorton, Gary and Matrick, Andrew. (2010) Hair cuts, Federal Reserve Bank of St. Louis Review, November/December 2010, 92 (6), pp. 507-19. 												
Modulstruktur	<ol style="list-style-type: none"> Introduction Frictions in Financial Markets The Role of Banks in Corporate Lending Banks as Liquidity Insurance Fragility of the Banking Sector Government Intervention in the Banking Sector Banking Regulation The Shadow Banking Sector Investment Bank Financial Innovations and FinTechs 												
Verwendbarkeit für andere Module und Programme	Master's Thesis												
Letztes Freigabedatum	12.02.2019												

Risk Governance & Organisation [FIN71432]

Module Coordinator					
Programme(s)		Master of Finance			
Term		Semester 2 Q4			
Module Duration		1 Semester			
Compulsory/Elective Module		Concentration Module			
Credits:		6			
Frequency		Annually			
Language		English			
Total Workload	150 h	Academic Teaching Hours:	44	Remaining Workload:	Self-study
		One academic teaching hour corresponds to 40 minutes.			
		Self-study includes lesson preparation and follow-up activities, reading assignments, assessment preparation, take-home assignments, etc.			
Prerequisites		Risk Management core module			

Content

This module looks at the key elements to successfully managing all risks found in financial institutions, where it is made clear that each financial institution has a unique risk profile depending on its business, its risk appetite and risk bearing capacity. However, it is also made clear that all risk management systems established at a financial institution look similar in the sense that they all face similar or comparable risks and should establish an overall risk management framework covering practice-proven principles for effective and efficient risk management. Such risk management framework will be looked at by decomposing it into its five elements strategy, infrastructure, process, policies / guidelines and risk culture. Thereby, the importance of the establishment of adequate segregation of duties and an appropriate risk culture next to technical processes and tools is underlined.

Focus will always remain on organisation and governance, but not on risk models for more or less sophisticated quantification of these risks.

1. Credit Risk

The seminar starts with a case study on credit risk, making course participants aware of what is required in a lending company to ensure unwanted credit risk will not bring the company to an unwanted ending. We will work out the main elements of a framework for Credit Risk Management covering strategy, infrastructure, process, policy and risk culture. The main steps of a combined lending and credit risk management process will be focus of this module, including basic considerations for product development and definition of target clients, client analysis, client classification, guarantee requirements, the decision process, authority schedules, lending controls and loan portfolio management. The module then elaborates the concept of an early warning system for the early identification of problems and also presents best practice approaches for problem loan management and credit risk reporting. The module will link with credit risk quantification as presented in the "Risk Management" module and introduce the concept of a Post Mortem Analysis to learn from defaulted loans.

2. Market Risk (FX and IR Risk)

Part 2 discusses the main Market Risks relevant to financial institutions: Foreign Currency Risk (FX) and Interest Rate Risk (IR). Again, related case studies will be looked at to see what can go wrong if these risks are not managed well. The framework components for managing these risks are then introduced and the process to manage each risk is described separately. Basic tools to identify and evaluate both FX and IR Risk are introduced and the concept of an Asset-Liability-Committee (ALCO) to practically manage Market Risks (and others) is presented. A crossover is thereby made to a later module, Liquidity Risk Management.

3. Counterparty Risk

This part covers the main aspects of counterparty risk, which is presented as a special case of credit risk that financial institutions enter into when executing financial transactions with others. The module will introduce participants to the main process steps for this risk management activity (analysis and selection of counterparties, approval of counterparties and

exposures, exposure calculation and limit monitoring, maintenance of an approved counterparty list) and explain how this risk function should be organized. The module will include the main aspects of related changes as per Basel III.

4. Liquidity Risk

Following the discussion of Market Risks this part covers a related risk category, which is Liquidity Risk. This module provides an overall introduction to this risk, how it is created in a financial institution and how it can be dealt with. It will distinguish between short-term repayment risk and long term funding risk. A basic tool and indicators for the measurement and monitoring of Liquidity Risk will be introduced. Again, a case-study approach is taken to find a practical entry to the topic. The module closes by reverting once more to the concept of an Asset-Liability-Committee (ALCO) to practically manage Market Risks and Liquidity Risk.

5. Operational Risk

This part is dedicated to the introduction to Operational Risk Management. It includes a discussion of the standard categories of operational risk (inadequate or failed internal processes, people, fraud, compliance and systems, external events – and a few more) and suggested standards for managing these (Risk Assessments, Risk Maps, New Risk Approvals, Key Risk Indicators and Risk Event Management).

The view on Operational Risk Management is enlarged by clarifying the fundamental difference of the role of Internal Audit, Internal Control and the role and process of Operational Risk Management. In this context, the “Three Lines of Defense” model will be presented and special functions like Fraud Prevention, Compliance and Information Security are introduced and discussed.

6. Risk Governance

After introducing the main features of Corporate Governance, a link is made to the Risk Management Framework presented in the preceding modules of this seminar. The overlap of Corporate Governance with Risk Management is defined as Risk Governance and the main functionalities and tasks are explained. Focus is put on the responsibilities of the Board, Management and Risk Management.

This topic also includes the main considerations about how to establish and maintain an appropriate **risk culture** in a financial institution. The part closes with a summarising view on integrated performance and risk management and a discussion on the main success factors for implementing an effective risk management function in a financial organisation.

7. Risk Management Regulation

Looking at the regulations on risk management as designed by the ECB provides insight into how regulators want banks to implement risk management and the benchmark regulators apply themselves when supervising banks. The module will take a brief look at the history of Basel recommendations and take a closer look at how these have been

	<p>translated into the regulatory framework of the ECB. The module will also look at the regulatory stress testing exercised by the ECB.</p> <p>8. Sustainability Risk Given recent regulatory development in requirements for the incorporation of sustainability risk into the business models of financial institutions we will look at these and how they add to current risk management frameworks.</p>
Intended Learning Outcomes	<p><i>Knowledge:</i> On successful completion of this module, students will have a thorough understanding of risk governance and organisation, i.e. they can:</p> <ul style="list-style-type: none"> • Develop the components of a comprehensive risk management framework in a financial institution, covering all pertinent risks • Explain the main prerequisites for a successful risk management organisation • Examine the mutual impact of corporate governance organisation, process and resources with risk management • Illustrate the functioning of financial regulation • Describe how all these factors are an integral part of steering and managing a financial institution <p><i>Skills:</i> On successful completion of this module, students will have the ability to apply their advanced knowledge on risk governance effectively, i.e. they can:</p> <ul style="list-style-type: none"> • Support the achievement of business objectives through the effective and efficient set-up of a risk management framework • Effectively and appropriately utilize technical skills acquired during other modules in a risk management context and with regard to all risk management categories, from Credit Risk to Operational risk (Risk Assessments, Problem Loan Management, Liquidity Oversight Tables, VaR and other quantification models, New Risk Approvals, Risk Event Management, Risk Awareness Training, etc.) • Implement related qualitative regulatory requirements in a financial institution <p><i>Competence:</i> On successful completion of this module, students will have the competence to access gained abilities in a business setting, i.e. they can:</p> <ul style="list-style-type: none"> • Review existing set-ups in financial institutions identifying shortcomings in terms of risk management organization, process and culture • Develop enhancements for existing risk management frameworks at financial institutions, with the objective of establishing a risk management system that best fits the institution's current set up and future requirements • Support management of the risk management function in a financial institution

Forms of teaching, methods and support	Interactive presentation, case studies, sample tools, rehearsal quizzes during term, reading list, papers and presentations by students.			
Type of Assessment(s) and performance	Type of examination	Duration or length	Performance Points	Due date or date of exam
	Class participation	throughout the module	15	During the module
	Case presentation	30 min	60	During the module
	Written exam	45 min	45	Exam week

Recommended Literature
Credit Risk Management

- Christian Bluhm, Ludger Overbeck, Christoph Wagner, Chapman & Hall 2003, An Introduction to Credit Risk Modeling, Chapter 1
- Bank for International Settlements, Basel 2006, Sound credit risk assessment and valuation for loans at <http://www.bis.org/publ/bcbs126.htm>
- Bank for International Settlements, Basel 2000, Principles for the Management of Credit Risk at <http://www.bis.org/publ/bcbs75.htm> (suggested for translation)

Market Risk

- Diamantini, S., A Primer on Currency Risk Management for Microfinance Institutions, J.P. Morgan Chase & Co., January 2010, found on <http://www.microfinancegateway.org/library/primer-currency-risk-management-microfinance-institutions>
- Committee of European Banking Supervisors (CEBS), March 2006, Consultation paper on technical aspects of the management of interest rate risk arising from nontrading activities and concentration risk under the supervisory review process
- Oesterreichische Nationalbank, 2008, Guidelines on Managing Interest Rate Risk in the Banking Book
- Interest rate risk in the banking book, bcbs April 2016: <http://www.bis.org/bcbs/publ/d368.htm>

Liquidity Risk

- Basel Committee on Banking Supervision, January 2013, Basel III: The Liquidity Coverage Ratio and liquidity risk monitoring tools at <http://www.bis.org/publ/bcbs238.htm>
- Comptroller of the Currency / Administrator of National Banks, June 2012, Comptroller's Handbook – Liquidity at <http://www.occ.gov/publications/publications-by-type/comptrollers-handbook/liquidity.pdf>

Operational Risk

- Bank for International Settlements, Basel 2020, Revisions to the principles for the sound management of operational risk at <https://www.bis.org/bcbs/publ/d508.htm>
- IIA Position Paper: THE THREE LINES OF DEFENSE IN EFFECTIVE RISK MANAGEMENT AND CONTROL, JANUARY 2013 available on <https://na.theiia.org/standards-guidance/recommended-guidance/Pages/Position-Papers.aspx> Detailed Loss Event Type Classification in Annex 9 of the Basel II framework at www.bis.org/publ/bcbs128.pdf
- Bank for International Settlements, Basel 2014, Sound management of risks related to money laundering and financing of terrorism at <http://www.bis.org/publ/bcbs275.htm>

	<ul style="list-style-type: none"> • Bank for International Settlements, Basel 2005, Compliance and the compliance function in banks at http://www.bis.org/publ/bcbs113.htm <p>Risk Governance</p> <ul style="list-style-type: none"> • “Principles for enhancing corporate governance”, Basel Committee on Banking Supervision, Basel, 2010 • Bank for International Settlements (2015). Guidelines - Corporate Governance Principles for Banks. Basel Committee on Banking Supervision, Basel, Switzerland • OECD (2004). Principles of Corporate Governance. OECD, Paris, France <p>Regulations</p> <ul style="list-style-type: none"> • Minimum Requirements for Risk Management at German banks (MaRisk) at https://www.bafin.de/SharedDocs/Downloads/DE/Rundschreiben/rs_1709_MaRisk_english.html?nn=9021442 • ECB Guide to banking supervision at https://www.ecb.europa.eu/pub/pdf/other/ssmguidebankingsupervision201409en.pdf?85e39f5cf761e11147f6e828cd4088b1 <p>Sustainability Risk</p> <ul style="list-style-type: none"> • https://ec.europa.eu/info/business-economy-euro/banking-and-finance/sustainable-finance/overview-sustainable-finance/platform-sustainable-finance_en
Module Structure	<p>The module is subdivided into 8 parts.</p> <ul style="list-style-type: none"> • Five parts will discuss organisational and process requirements for each main risk category • One part will focus on risk governance and the success factors for the implementation of risk management within a financial institution's corporate governance framework • The module includes case studies on risk governance and risk management failures • The seventh part describes how risk management is defined by regulators. Focus will be put on the supervisory process of the ECB • The last part describes recent complementations as required to cover sustainability risk
Usability in other Modules/Programmes	Other modules in Risk Management Concentration
Last Approval Date	2021/10/14

Master in Management (MiM)

Strategic Management [MGT71560]

Modulkoordinator		Fitza, Markus			
Studiengang		MSc MiM			
Studienabschnitt		Semester 2 Q3			
Moduldauer		1 Semester			
Pflicht- /Wahlpflichtmodul		Pflicht			
Credits:		6			
Häufigkeit des Angebots		Jährlich			
Sprache		Englisch			
Workload:	150 h	Präsenz:	44 h	Selbststudium:	106 h
Voraussetzungen für die Teilnahme		Business Economics			
Kurzbeschreibung / Lerninhalte		<p>Strategy is about why some firms are successful and others are not. The course develops an understanding of how firms can design processes in markets and organisations to achieve competitive advantages. The first part of the course offers a comprehensive overview of how market processes affect firm profitability. The second part discusses how organisational processes contribute to competitive advantages.</p>			

Qualifikationsziele / Lernergebnisse	<p><i>Knowledge:</i> On successful completion of this module, students will have a thorough comprehension of principal concepts and theories in strategic management, i.e. they can:</p> <ul style="list-style-type: none"> • Explain the main concepts and theories of strategic management, • Outline how industry- and firm-level factors contribute to financial performance. <p><i>Skills:</i> On successful completion of this module, students will have the proven ability to apply advanced knowledge in Strategic Management and to solve complex managerial problems, i.e. they can:</p> <ul style="list-style-type: none"> • Apply theories and concepts to analyse real-worlds problems in firms and industries, • Analyse how firm-level factor contribute to performance • Identify how market processes affect firm profitability, • Evaluate the advantages and disadvantages of alternatives corporate and business strategies. <p><i>Competencies:</i> On successful completion of this module, students can:</p> <ul style="list-style-type: none"> • Structure the strategic analysis of firms and markets, • Present and argue for a strategic analysis, • Develop strategic recommendations, • Argue the advantages and disadvantages of strategic recommendations. 																
Lernformen, Methodik und Betreuung	Lectures, classroom discussion, classroom experiments, case presentations																
Art der Prüfungsleistungen im Modul und Akkumulationspunkte	<table border="1"> <thead> <tr> <th>Type of examination</th> <th>Duration or length</th> <th>Performance Points</th> <th>Due date or date of exam</th> </tr> </thead> <tbody> <tr> <td>Group presentation</td> <td>20 min each</td> <td>60</td> <td>During the term</td> </tr> <tr> <td>Class participation</td> <td></td> <td>20</td> <td>During the module</td> </tr> <tr> <td>Exercises and quizzes</td> <td></td> <td>40</td> <td>During the module</td> </tr> </tbody> </table>	Type of examination	Duration or length	Performance Points	Due date or date of exam	Group presentation	20 min each	60	During the term	Class participation		20	During the module	Exercises and quizzes		40	During the module
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Group presentation	20 min each	60	During the term														
Class participation		20	During the module														
Exercises and quizzes		40	During the module														
Literaturhinweise	I recommend the following books: “Strategic Management”, by Dess, Lumpkin and Eisner and Besanko et al., Economics of Strategy, 7th edition, Wiley 2017. But this is not a requirement, you can use the books as a reference source.																
Modulstruktur	Lectures will be scheduled over the course of the semester. A high degree of active student involvement is expected. The conceptual and theoretical discussion will be supplemented by case studies, classroom experiments, and group work in class.																

Verwendbarkeit für andere Module und Programme	Concentration Strategy & Organisation; Master's Thesis
Letztes Freigabedatum	17.12.2019

Leadership and Organisational Behaviour
[MGT74910]

Modulkoordinator		Rerup, Claus			
Studiengang		MSc MiM			
Studienabschnitt		Semester 2 Q4			
Moduldauer		1 Semester			
Pflicht- /Wahlpflichtmodul		Pflicht			
Credits:		6			
Häufigkeit des Angebots		Jährlich			
Sprache		Englisch			
Workload:	150 h	Präsenz:	44 h	Selbststudium:	106 h
Voraussetzungen für die Teilnahme		Basic knowledge of organizational behavior/theory, scientific training beyond the bachelor level in some discipline.			
Kurzbeschreibung / Lerninhalte		<p>Business organisations of all types face chronic management and leadership problems that pose significant challenges to them. These problems include the difficulty of designing organisations capable of coping with highly dynamic business environments, the challenge of developing strategies and structures for hypercompetitive conditions, the greater complexity of managing global enterprises, the difficult task of shaping a corporate culture, managing politics and conflict between individuals and organisational units, motivating employees who are more mobile than ever, leading managerial teams effectively, and so on. These and other challenges, and how leaders of organisations can deal with them, are the subject of this course.</p>			

Qualifikationsziele / Lernergebnisse	<p>The course will introduce you to tools and frameworks that will help you understand and manage the challenges posed by leadership in modern organisations. These frameworks will provide you with a better basis for evaluating organisations and the people within them. In addition to providing you with a framework for understanding leadership challenges, a second objective of this course is to teach you skills in applying those theories and frameworks to leadership situations with appropriate solutions. Leadership skills are most effectively developed through practice. Therefore, it is essential that you have considerable opportunity to work on actual leadership problems. In order to do this we will rely heavily on case analyses. Cases and various exercises will provide the material to practice analysing and addressing leadership challenges. You are expected to carefully analyse all of the cases, prepare your thoughts on them, and participate in the analyses in class. It is my hope that by the end of the term, you will be able to see organisational and leadership problems in ways you could not see them before. More importantly, you will leave the course more conscious of the consequences related to the choices you make as a leader in an organisation.</p> <p><i>Knowledge:</i> On successful completion of this module, students will have a thorough comprehension of principal concepts and theories in leadership and organisational behavior, i.e. they can</p> <ul style="list-style-type: none"> • explain the main concepts in leadership and organisational behaviour • illustrate key constructs by means of case studies and real-time stories in the news • outline the relevance and irrelevance of leader • apply course material to their own context, and draw implications for how to act <p><i>Skills:</i> On successful completion of this module, students will have the proven ability to apply advanced knowledge in leadership and organisational behaviour and to solve complex managerial problems, i.e. they can</p> <ul style="list-style-type: none"> • apply theories and concepts to analyse real-worlds problems • evaluate leadership and organisational behaviour problems from different perspectives (logics) • draw relational maps and apply them to leadership and organisational behaviour problems <p><i>Competencies:</i> On successful completion of this module, students can</p> <ul style="list-style-type: none"> • structure the analysis of leadership and organisational behaviour problems across the individual, team and organisational levels of analysis • develop leadership and organisational behaviour recommendations • argue for the pros and cons of specific recommendations
Lernformen, Methodik und Betreuung	Lectures, classroom discussion, classroom experiments, case presentations, team work

Art der Prüfungsleistungen im Modul und Akkumulationspunkte	<p>The grade for this course will be computed from the following components:</p> <table border="1" data-bbox="480 405 1378 943"> <thead> <tr> <th data-bbox="480 405 700 479">Type of examination</th> <th data-bbox="700 405 935 479">Duration or length</th> <th data-bbox="935 405 1155 479">Performance Points</th> <th data-bbox="1155 405 1378 479">Due date</th> </tr> </thead> <tbody> <tr> <td data-bbox="480 479 700 553">Team project assignment</td> <td data-bbox="700 479 935 553"></td> <td data-bbox="935 479 1155 553">65</td> <td data-bbox="1155 479 1378 553">Sunday May 31, 2020 at midnight</td> </tr> <tr> <td data-bbox="480 553 700 663">Individual Fall from Grace assignment</td> <td data-bbox="700 553 935 663"></td> <td data-bbox="935 553 1155 663">30</td> <td data-bbox="1155 553 1378 663">Sunday June 7, 2020 at midnight</td> </tr> <tr> <td data-bbox="480 663 700 772">Individual online class contribution</td> <td data-bbox="700 663 935 772"></td> <td data-bbox="935 663 1155 772">10</td> <td data-bbox="1155 663 1378 772">During the semester</td> </tr> <tr> <td data-bbox="480 772 700 943">Individual application challenges</td> <td data-bbox="700 772 935 943"></td> <td data-bbox="935 772 1155 943">15</td> <td data-bbox="1155 772 1378 943">Sunday May 3, 2020 at midnight; Sunday May 17, 2020 at midnight</td> </tr> </tbody> </table>	Type of examination	Duration or length	Performance Points	Due date	Team project assignment		65	Sunday May 31, 2020 at midnight	Individual Fall from Grace assignment		30	Sunday June 7, 2020 at midnight	Individual online class contribution		10	During the semester	Individual application challenges		15	Sunday May 3, 2020 at midnight; Sunday May 17, 2020 at midnight
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Individual application challenges		15	Sunday May 3, 2020 at midnight; Sunday May 17, 2020 at midnight																		
Literaturhinweise	There is no text book for this course. The course consists of selected readings and cases.																				
Modulstruktur	Lectures will be scheduled over the course of the semester. A high degree of active student involvement is expected. The conceptual and theoretical discussion will be supplemented by case studies, video cases, tests, classroom experiments, and team work in class.																				
Verwendbarkeit für andere Module und Programme	Electives, Master's Thesis																				
Letztes Freigabedatum	06.01.2020																				

Innovation Management [MGT71410]

Modulkoordinator		Schlapp, Jochen			
Studiengang		MSc MiM			
Studienabschnitt		Semester 3			
Moduldauer		1 Semester			
Pflicht- /Wahlpflichtmodul		Pflicht			
Credits:		6			
Häufigkeit des Angebots		Jährlich			
Sprache		Englisch			
Workload:	150 h	Präsenz:	44 h	Selbststudium:	106 h
Voraussetzungen für die Teilnahme		None			
Kurzbeschreibung / Lerninhalte		<p>In most industries, good R&D performance is critical to generate and sustain a lasting market success, and at the heart of every R&D process is a firm's innovation management. Starting with the generation of possible innovation opportunities, and continuing with the selection of the most promising ideas and the transformation of these ideas into final products, innovation management has to deal with a set of utterly diverse challenges. For instance, should innovation be incremental or radical; or what are the benefits and costs of open innovation? This course sets out to discuss the key challenges that are inherent to innovation and product development processes. To this end, the course also introduces students to business model innovations and the impact of new technologies on existing R&D strategies.</p>			

Qualifikationsziele / Lernergebnisse	<p><i>Knowledge:</i> On successful completion of this module, students will have a thorough comprehension of principal concepts and theories in innovation and R&D management; i.e., they can:</p> <ul style="list-style-type: none"> • explain the main concepts and theories of innovation management, • identify the key challenges in different stages of the innovation process, • understand the impact of R&D decisions on firm performance. <p><i>Skills:</i> On successful completion of this module, students will have the proven ability to apply advanced knowledge in innovation management and to solve complex managerial problems; i.e., they can:</p> <ul style="list-style-type: none"> • apply theories and concepts to analyse and optimise real-world problems, • evaluate the interactions between different strategic decisions and create strategic alignment, • design organisational structures that promote innovation, • evaluate the benefits and shortcomings of different innovation processes. <p><i>Competencies:</i> On successful completion of this module, students can:</p> <ul style="list-style-type: none"> • develop a coherent innovation strategy, • structure innovation processes, • evaluate the impact of innovation on firm performance. 																							
Lernformen, Methodik und Betreuung	Lectures, classroom discussions, classroom experiments, case presentations																							
Art der Prüfungsleistungen im Modul und Akkumulationspunkte	<table border="1" data-bbox="480 1350 1378 1731"> <thead> <tr> <th data-bbox="480 1350 700 1429">Type of examination</th> <th data-bbox="700 1350 935 1429">Duration or length</th> <th data-bbox="935 1350 1155 1429">Performance Points</th> <th data-bbox="1155 1350 1378 1429">Due date or date of exam</th> </tr> </thead> <tbody> <tr> <td data-bbox="480 1429 700 1507">Final written exam</td> <td data-bbox="700 1429 935 1507">60 min</td> <td data-bbox="935 1429 1155 1507">60</td> <td data-bbox="1155 1429 1378 1507">End of the module</td> </tr> <tr> <td data-bbox="480 1507 700 1585">Presentation (group)</td> <td data-bbox="700 1507 935 1585"></td> <td data-bbox="935 1507 1155 1585">35</td> <td data-bbox="1155 1507 1378 1585">During the module</td> </tr> <tr> <td data-bbox="480 1585 700 1664">Quizzes</td> <td data-bbox="700 1585 935 1664"></td> <td data-bbox="935 1585 1155 1664">15</td> <td data-bbox="1155 1585 1378 1664">During the module</td> </tr> <tr> <td data-bbox="480 1664 700 1731">Class participation</td> <td data-bbox="700 1664 935 1731"></td> <td data-bbox="935 1664 1155 1731">10</td> <td data-bbox="1155 1664 1378 1731">During the module</td> </tr> </tbody> </table>				Type of examination	Duration or length	Performance Points	Due date or date of exam	Final written exam	60 min	60	End of the module	Presentation (group)		35	During the module	Quizzes		15	During the module	Class participation		10	During the module
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Quizzes		15	During the module																					
Class participation		10	During the module																					

Literaturhinweise	<ul style="list-style-type: none"> • Christensen. 2000. The Innovator's Dilemma. Harvard Business Review Press. • Girotra, Netessine. 2014. The Risk-Driven Business Model. Harvard Business Review Press. • Loch, Kavadias. 2008. Handbook of New Product Development Management. Butterworth-Heinemann. • Ries. 2017. The Lean Startup. Currency. • Schilling. 2015. Strategic Management of Technological Innovation. McGraw-Hill.
Modulstruktur	Lectures will be scheduled over the course of the semester. A high degree of active student involvement is expected. The conceptual and theoretical discussion will be supplemented by case studies, classroom experiments, and group work in class.
Verwendbarkeit für andere Module und Programme	Concentrations: Strategy, Technology & Operations, Digital Business; Thesis
Letztes Freigabedatum	08.08.2017

For the following courses, the module descriptions will not be available before January 2022. You can find here a short overview of the content. Thank you for your understanding.

Corporate Finance and Governance

The Corporate Finance and Governance course focuses on corporate governance, corporate investment decisions, corporate financing, and payout policy. Students will act in a position of corporate decision makers applying analytical methods in real-life case studies. The course enables students to design corporate governance structures, make educated investment and financial decisions, and evaluate corporate financial decisions.

Power, Politics, and Social Networks

The world runs on social relationships and social networks. Relationships are essential for getting work done, as well as to the way leaders engage in leading and leadership. Effective leaders and followers in any position use relationships to manage up, down and sideways. Work is accomplished through formal and informal relationships – social networks – and participants can be more effective if they understand the strength and weakness of their social relations. In any job it is important to build power and manage relationships with both peers and superiors. The question is, how do you do it? In this course, we provide the answers by using a social network perspective.

Optimization & Decision Models

The module provides students with a sound foundation in the application of the many tools and techniques of management science. Students are expected to learn the tools and the applications of modelling, optimisation, computing and programming in solving practical problems drawn from different functional areas (operations, finance, marketing, and human resources, etc.) in different organisations.

Operations Strategy [MGT73762]

Module Coordinator		Schlapp, Jochen			
Programme(s)		Master in Management			
Term		Semester 2 Q4			
Module Duration		1 Semester			
Compulsory/Elective Module		Concentration Module			
Credits:		6			
Frequency		Annually			
Language		English			
Total Workload	150 h	Academic Teaching Hours:	44	Remaining Workload:	Self-study
		One academic teaching hour corresponds to 40 minutes.			
		Self-study includes lesson preparation and follow-up activities, reading assignments, assessment preparation, take-home assignments, etc.			
Prerequisites		No specific prerequisite is requested			
Content		<p>In today's fast-paced markets, firms continuously have to improve and reinvent their value creation process to stay ahead of their competitors. To achieve this, it is crucial for a firm to derive and implement an operations strategy that supports the firm's unique value proposition and that is well synchronized with other supporting functions such as, e.g., human resources, finance, and sales.</p> <p>This course provides a broad coverage of the many different facets of operations strategy. The topics include the historical sources of operations strategy, its link to other strategic decisions, procurement, the role of organizational learning and forgetting, the integration of new technologies, search theory, new business models, environmental considerations, revenue management, and the question of how to manage the implementation of a new strategic initiative.</p>			

<p>Intended Learning Outcomes</p>	<p><i>Knowledge:</i> On successful completion of this module, students will have a thorough comprehension of principal concepts and theories in operations; i.e., they can:</p> <ul style="list-style-type: none"> • explain the main concepts and theories of operations strategy, • identify the key challenges in designing efficient value creation processes, • understand the impact of operational decisions on firm performance. <p><i>Skills:</i> On successful completion of this module, students will have the proven ability to apply advanced knowledge in operations strategy and to solve complex managerial problems; i.e., they can:</p> <ul style="list-style-type: none"> • apply theories and concepts to analyse and optimise real-world problems, • evaluate the interactions between different strategic decisions and create strategic alignment, • evaluate the benefits and shortcomings of different value creation processes. <p><i>Competencies:</i> On successful completion of this module, students can:</p> <ul style="list-style-type: none"> • develop a coherent operations strategy, • structure value creation processes, • evaluate the impact of operations on firm performance. 																
<p>Forms of teaching, methods and support</p>	<p>Lectures, classroom discussions, classroom experiments, case presentations</p>																
<p>Type of Assessment(s) and performance</p>	<table border="1" data-bbox="480 1350 1378 1659"> <thead> <tr> <th>Type of Examination</th> <th>Duration</th> <th>Performance Points</th> <th>Due Date</th> </tr> </thead> <tbody> <tr> <td>Class Participation</td> <td>ongoing</td> <td>20</td> <td>During the module</td> </tr> <tr> <td>Quizzes</td> <td></td> <td>30</td> <td>During the module</td> </tr> <tr> <td>Essay (individual or group)</td> <td></td> <td>70</td> <td>End of the module</td> </tr> </tbody> </table>	Type of Examination	Duration	Performance Points	Due Date	Class Participation	ongoing	20	During the module	Quizzes		30	During the module	Essay (individual or group)		70	End of the module
Type of Examination	Duration	Performance Points	Due Date														
Class Participation	ongoing	20	During the module														
Quizzes		30	During the module														
Essay (individual or group)		70	End of the module														
<p>Recommended Literature</p>	<ul style="list-style-type: none"> • J. van Mieghem, G. Allon. 2015. Operations Strategy: Principles and Practice. Dynamic Ideas, Massachusetts, USA. • N. Slack, M. Lewis. 2015. Operations Strategy. Pearson, UK. • R. Hayes, G. Pisano, D. Upton, S. Wheelwright. 2005. Pursuing the Competitive Edge. John Wiley & Sons, USA. • G. Pisano, D. Upton, R. Hayes. 1996. Strategic Operations: Competing through Capabilities. Free Press, USA. 																

Module Structure	Topic 1: Foundations of Operations Strategy and the VCAP Framework Topic 2: Capabilities, Competition and Operations Topic 3: Investing in Real Assets: The Make Decision Topic 4: Procurement: The Buy Decision Topic 5: Managing Demand Topic 6: Operational Complexity and Regulation
Usability in other Modules/Programmes	Master's Thesis
Last Approval Date	2021/10/13

Managerial Decision Making [MGT72831]

Module Coordinator		Aydinli, Aylin; Atalay, Selin			
Programme(s)		Master in Management			
Term		Semester 2 Q4			
Module Duration		1 Semester			
Compulsory/Elective Module		Concentration Module			
Credits:		6			
Frequency		Annually			
Language		English			
Total Workload	150 h	Academic Teaching Hours:	44	Remaining Workload:	Self-study
		One academic teaching hour corresponds to 40 minutes.			
		Self-study includes lesson preparation and follow-up activities, reading assignments, assessment preparation, take-home assignments, etc.			
Prerequisites		n/a			
Content		<p>The objectives of this module are to help you (a) understand why we often make bad decisions and (b) learn how to make better decisions.</p> <p>Every day we make several trivial and critical decisions. While most of us believe we are capable of making good decisions, reality shows that often we do not. This is supported by research on behavioural economics and decision making showing that most decision makers deviate from rationality in systematic ways. For example, why do managers overpay for acquisitions, persist in investing in losing projects, hire the wrong people, or design products that result in customer dissatisfaction? Similarly, why do consumers overpay for warranties, buy products they do not use, or not buying ones they may later wish they had? By better understanding how decisions are made, we are more likely to overcome limitations with awareness and improve the quality of our decisions. Thus, this module focuses on the behavioral approach to managerial decision making, which are largely grounded in psychology and behavioral economics.</p> <p>It will a) cover the main behavioural theories and principals, b) focus on implications of the systematic decision biases for managers and policy makers, and c) develop skills to motivate desired behaviors in others through behavioral interventions.</p>			

Intended Learning Outcomes	<p>By the end of this module you will learn the fundamental principles and theories of judgment and decision-making. A deeper understanding of these principles will enable you to identify behavioral challenges and opportunities in various settings including marketing, public policy, health services, entrepreneurship, and finance.</p> <p>Specifically,</p> <ul style="list-style-type: none"> You will learn how to improve decision-making skills You will analyze business and public policy problems from a behavioral perspective You will apply behavioral solutions to business and public policy problems. 												
Forms of teaching, methods and support	<p><i>Lectures:</i> The lectures blend theory with practical insights, and additional examples. Despite the lecture label, these sessions are intended to be an interactive and collaborative learning experience, where questions and discussions are encouraged.</p> <p><i>Group Project:</i> Students will work in groups on a project applying class concepts. The students will present their work during the last session. More information about the group project will be provided during the course.</p>												
Type of Assessment(s) and performance	<table border="1" data-bbox="480 1122 1378 1335"> <thead> <tr> <th>Type of Assessment</th> <th>Duration</th> <th>Performance Points</th> <th>Due Date or Date of Exam</th> </tr> </thead> <tbody> <tr> <td>Individual assignment</td> <td>tba</td> <td>60</td> <td>Exam week</td> </tr> <tr> <td>Group Project</td> <td>tba</td> <td>60</td> <td>Last session</td> </tr> </tbody> </table>	Type of Assessment	Duration	Performance Points	Due Date or Date of Exam	Individual assignment	tba	60	Exam week	Group Project	tba	60	Last session
Type of Assessment	Duration	Performance Points	Due Date or Date of Exam										
Individual assignment	tba	60	Exam week										
Group Project	tba	60	Last session										
Recommended Literature	tba												
Module Structure	<ul style="list-style-type: none"> Heuristics and biases Decision making under risk and prospect theory Resisting temptation and intertemporal choice Motivated Reasoning Overconfidence Intuition Mental accounting Choice architecture & behavior change (nudging) 												
Usability in other Modules/Programmes	n/a												
Last Approval Date	2021/11/18												

**Designing & Analyzing Business
Experiments [MGT73753]**

Module Coordinator		Schwerter, Frederik; Grunewald, Andreas			
Programme(s)		Master in Management			
Term		Semester 2 Q4			
Module Duration		1 Semester			
Compulsory/Elective Module		Concentration Module			
Credits:		6			
Frequency		Annually			
Language		English			
Total Workload	150 h	Academic Teaching Hours:	44	Remaining Workload:	Self-study
		One academic teaching hour corresponds to 40 minutes.			
		Self-study includes lesson preparation and follow-up activities, reading assignments, assessment preparation, take-home assignments, etc.			
Prerequisites		Business Statistics			
Content		<p>In the last decade it has become increasingly uncomplicated to collect and analyze data. As a consequence, an increasing number of companies exploit experiments and randomized controlled trials to evaluate the impact of their management decisions on key performance indicators. This course gives an introduction to the techniques needed to design and analyze such experiments in the business context. We will focus on the following goals:</p> <p>First, we will equip students with a basic understanding of the differences between correlations and causality and the challenges to identify causal relationships.</p> <p>Second, we will provide a systematic guide on how to design randomized controlled trials in order to identify the causal impact of management decisions.</p> <p>Third, we will familiarize students with typical data structures arising from experiments and discuss how to analyze such data.</p> <p>Fourth, we will give a selective overview of important results and the state of the art in the current literature.</p>			

<p>Intended Learning Outcomes</p>	<p>Knowledge: Upon completion of the course students will know how experimental data can help managers to make the best decisions for their company. In particular, students will know different techniques to collect data and how to design business experiments. They will also know important current applications of randomized controlled trials.</p> <p>Skills: Upon completion of the course, students will be able to judge the extent to which existing data sets can be used to guide decisions and how to collect new data if needed. Moreover, they will learn how to handle different kinds of data sets, which can provide important guidance for management decisions. This includes a thorough comprehension of the limits of data analysis in management decision.</p> <p>Competencies: On successful completion of this module, students can take responsibility to transfer the learned concepts to real world situations pertaining to typical management decisions, e.g. they can:</p> <ul style="list-style-type: none"> • Design a business experiment in order to evaluate a management practice • Identify a causal relationship from the arising data. • Argue competently about problem solution strategies
<p>Forms of teaching, methods and support</p>	<p>The course is taught interactively. While we start with a series of lectures to introduce the topic, there is also a considerable number of exercise tasks to train participants. Case studies and simulations help to improve the learning experience. Finally, students will give a presentation about a particular Business Experiment in the second part of the course.</p>

Type of Assessment(s) and performance	<table border="1"> <thead> <tr> <th>Type of Examination</th> <th>Duration or length</th> <th>Performance Points</th> <th>Due date or date of exam</th> </tr> </thead> <tbody> <tr> <td>Class participation</td> <td>Continuous</td> <td>15</td> <td>Continuous</td> </tr> <tr> <td>Presentation</td> <td>45 mins</td> <td>45</td> <td>TBA</td> </tr> <tr> <td>Written exam</td> <td>60 mins.</td> <td>60</td> <td>Exam week</td> </tr> </tbody> </table>	Type of Examination	Duration or length	Performance Points	Due date or date of exam	Class participation	Continuous	15	Continuous	Presentation	45 mins	45	TBA	Written exam	60 mins.	60	Exam week
	Type of Examination	Duration or length	Performance Points	Due date or date of exam													
	Class participation	Continuous	15	Continuous													
	Presentation	45 mins	45	TBA													
	Written exam	60 mins.	60	Exam week													
<p>Class participation. You can earn credit towards your class participation score by contributing to our in-class discussion (of case studies etc.). In order to contribute to in-class discussions, of course, you must show up (online or offline). Please arrange your other activities to permit you to attend class. Mostly, our discussions will be free form: anyone who has something to contribute can and should do so.</p> <p>Presentation Students will present the design and evaluation of one particular business experiment in class. The topics will be handed out at the beginning of the course. After the presentations we will discuss the experiments.</p> <p>More details will be given at the beginning of the course.</p> <p>Final Exam More details will be given at the beginning of the course.</p>																	
<p>Recommended Literature</p> <p>There is no single textbook that covers the material of the course. You may want to look into the following references:</p> <p>Angrist, Joshua D., and Jörn-Steffen Pischke. <i>Mostly harmless econometrics</i>. Princeton university press, 2008.</p> <p>Bandiera, Oriana, Iwan Barankay, and Imran Rasul. "Field experiments with firms." <i>Journal of Economic Perspectives</i> 25.3 (2011): 63-82.</p>																	
<p>Module Structure</p> <p>With a more detailed break-down to follow at the beginning of class, the contents of the module are built up as follows:</p> <ol style="list-style-type: none"> A. Correlation versus Causality B. Design of Business Experiments C. Evaluation of Business Experiments D. Case Studies and Examples of Business Experiments 																	
<p>Usability in other Modules/Programmes</p> <p>Master's Thesis</p>																	
<p>Last Approval Date</p> <p>2021/10/28</p>																	

Master of Applied Data Sciences (MADS)

**Guided Studies in Financial Management
[ACC72211]**

Module Coordinator		Ecker, Frank			
Programme(s)		Master in Applied Data Science			
Term		Semester 2 Q3			
Module Duration		1 Semester			
Compulsory/Elective Module		Compulsory Module			
Credits:		6			
Frequency		Annually			
Language		English			
Total Workload	150 h	Academic Teaching Hours:	37	Remaining Workload:	Self-study
		Self-study includes lesson preparation and follow-up activities, reading assignments, assessment preparation, take-home assignments, etc.			
Prerequisites		1. An introductory course in Financial Accounting, e. g., Language of Business (Master in Applied Data Science), Financial Statement Analysis (Master of Finance, Accounting (Master in Management)).2. Basic knowledge of Stata (statistical package)3. (Basic knowledge of Python beneficial for certain Topics)			

<p>Content</p>	<p>The course highlights some of the many important purposes of fundamental (accounting) data, adopting either the perspective of a firm's management, its banks/creditors, or its investors decision-makers. The course starts with an introductory foray into capital markets, including credit analysis and firm valuations, and provides a short overview of important databases. The main focus of the course is on guiding small teams of students in designing and conducting empirical analyses of important practical questions in Stata. The collection and processing of raw data will be an integral part of these projects, as well as the actual data analysis itself and the evaluation of the results. With its strong focus on empirics, the course should provide students with valuable guidance for their master thesis projects.</p> <p>Possible topics for these guided studies are in areas of fundamental analysis, credit markets, stock markets and transaction analysis, including:</p> <p><u>Fundamental Analysis:</u></p> <ol style="list-style-type: none"> 1. Capital Market Implications of New Regulation: Are Markets "Early Adopters"? 2. Does Corporate Social Reporting Support or Hurt Profitability? 3. Operating Efficiency and Private Equity Investment 4. Succession Success in Private Firms 5. Foreign Ownership, Corporate Governance and Firm Performance <p><u>Credit Markets:</u></p> <ol style="list-style-type: none"> 1. Credit Ratings: Fundamentals, Change Prediction and Market Reactions 2. Debt Covenants and Consequences of Technical Default 3. Estimating Effective Bank Leverage 4. Management Tone and Bankruptcy Risk <p><u>Stock Markets:</u></p> <ol style="list-style-type: none"> 1. Assessing Valuation Accuracy: How Do Investors View Our Company? 2. Determinants and Consequences of the Conglomerate Discount 3. Trading Strategies on the European Stock Market 4. The Role of Sell-Side Equity Analysts for Capital Markets: Biased Players or Valuable Information Intermediaries? 5. What Matters For Equity Investors' Risk Assessment? 6. The Returns to Insider Trading 7. Tracing Warren Buffett's Value-Based Investment Strategy <p><u>Transaction Analysis:</u></p> <ol style="list-style-type: none"> 1. Assessing Synergies and Success Factors of M&A 2. Returns to Shareholder Activism: Target Identification, Goals and Success Determinants 3. Do Firms Learn From Peer Firm's Investments and M&A Mistakes?
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Intended Learning Outcomes	<p>On completion of the module, the student</p> <ul style="list-style-type: none"> • can identify important practical issues in management, • can identify ways of how empirical data can support business decision-making, • can design appropriate test designs, including variable constructions, • can perform statistical analyses, and • can critically evaluate the limitations of empirical results. 																
Forms of teaching, methods and support	<ul style="list-style-type: none"> • Interactive lecture and discussion • Project preparation in student teams, with final presentation 																
Type of Assessment(s) and performance	<table border="1" data-bbox="480 712 1378 987"> <thead> <tr> <th>Type of Assessment</th> <th>Duration</th> <th>Performance Points</th> <th>Due Date or Exam Date</th> </tr> </thead> <tbody> <tr> <td>Class participation</td> <td>all module</td> <td>10</td> <td>all module</td> </tr> <tr> <td>Final project</td> <td>one month</td> <td>80</td> <td>17.03.2021</td> </tr> <tr> <td>Final exam</td> <td>30 minutes</td> <td>30</td> <td>Exam week</td> </tr> </tbody> </table> <p>In order to fully assess the students competences in both theory and practice, three types of assessment are needed.</p>	Type of Assessment	Duration	Performance Points	Due Date or Exam Date	Class participation	all module	10	all module	Final project	one month	80	17.03.2021	Final exam	30 minutes	30	Exam week
Type of Assessment	Duration	Performance Points	Due Date or Exam Date														
Class participation	all module	10	all module														
Final project	one month	80	17.03.2021														
Final exam	30 minutes	30	Exam week														
Recommended Literature	None. A review of the topic-specific literature is required.																
Module Structure	<ul style="list-style-type: none"> • The Financial Manager and NPV • Principles of Capital Budgeting • Risk and Discount Rates • Capital Budgeting with Corporate Taxes • Firm Strategy and Profitability Analysis • Shareholder Value and Credit Analysis • Valuation I: Market Multiples • Valuation II: Discounted Cash Flow Models • As-if Accounting: R&D Capitalization • Final project preparation (Meetings...) • Final project presentations 																
Usability in other Modules/Programmes	All subsequent modules																
Last Approval Date	2021/01/08																

Machine Learning I [INF72010]

Module Coordinator		Wheeler, Gregory			
Programme(s)		MSc MADS			
Term		3rd Quarter			
Module Duration		1 Semester			
Compulsory/Elective Module		Compulsory Module			
Credits:		6			
Frequency		Annually			
Language		English			
Workload:	150 h	Contact hours:	44 h	Independent Learning:	106 h
Prerequisites		Semester 1,, Python			
Content		<p>Advanced data analytics employs techniques from machine learning and artificial intelligence to sift through large and even unstructured data to reveal patterns and identify trends to yield more accurate judgments and better-informed decisions. The aim of machine learning is to make a computer learn from data without explicitly programming it how to do so, and the fruits of machine learning are all around us: email spam filters classify your messages, postal services read and route billions of handwritten letters every month, online businesses and recommend products to customers, and speech-to-text transcribers now match the accuracy of human transcribers opening the possibility of real-time language translation - all using contemporary machine learning techniques.</p> <p>Financial institutions increasingly apply these very same techniques to an expanding range of problems, leveraging an increasing volume of data through daily operations and third-party sources to manage portfolio risk, perform trades, detect fraud, comply with regulations, and much, much more.</p> <p>This course is hands-on introduction to contemporary regression-based techniques in machine learning, with a focus on supervised learning algorithms (used to make accurate predictions about the future from current data) and unsupervised learning (used to discover unknown structure in your current data).</p>			

<p>Intended Learning Outcomes</p>	<p><i>Knowledge:</i> On successful completion of this module, students will have a rudimentary understanding of regression-based techniques in machine learning, with a focus on supervised learning algorithms (uses to make accurate predictions about the future from current data) and unsupervised learning (used to discover unknown structure in your current data).</p> <p><i>Skills:</i> Upon the successful completion of this module, students will have a hands-on experience implementing several core machine learning algorithms used in data analytics. Specifically, upon successful completion of the programming assignments for the course, students will have fully working implementations of</p> <ul style="list-style-type: none"> • Single and Univariate Regression models • Gradient Descent for multiple features • Logistic regression for multiple features • CART models • Time Series Analysis & Forecasting • A complete Neural Network, including implementations of a neural network cost function and back propagation for non-linear classification • K-means clustering <p><i>Competencies:</i> The course is designed to be a hands-on introduction to machine learning. To that end, students who successfully complete the course will be able to pursue two tracks:</p> <ul style="list-style-type: none"> • Students will have a rudimentary but working knowledge of how contemporary ML algorithms work, enabling them to be informed "citizen analysts" and to collaborate with data science teams. • Students without prior experience but with an interest to pursue studies in data science will be prepared to study an introduction to machine learning course in a computer science department or to follow one of several technical online courses in ML, statistics and data science. 												
<p>Forms of teaching, methods and support</p>	<p>The course will consist in theoretical lectures, where theory and programming tips are covered, and tutorials, where students will begin work on that week's programming assignment, which will be completed outside of class.</p> <p>In addition to the Professor, there will be Teaching Assistants for the course available to help students.</p>												
<p>Type of Assessment(s) and performance</p>	<table border="1"> <thead> <tr> <th>Type of examination</th> <th>Duration or length</th> <th>Performance Points</th> <th>Due date or date of exam</th> </tr> </thead> <tbody> <tr> <td>Five (5) Programming Assignments</td> <td>tbd</td> <td>70</td> <td>During the module</td> </tr> <tr> <td>Written exam</td> <td>50 min</td> <td>50</td> <td>During exam week</td> </tr> </tbody> </table>	Type of examination	Duration or length	Performance Points	Due date or date of exam	Five (5) Programming Assignments	tbd	70	During the module	Written exam	50 min	50	During exam week
Type of examination	Duration or length	Performance Points	Due date or date of exam										
Five (5) Programming Assignments	tbd	70	During the module										
Written exam	50 min	50	During exam week										

Recommended Literature	<p>We will use the following resources:</p> <ul style="list-style-type: none"> • Gregory Wheeler (2020) "Lecture Notes for Machine Learning." Available from course website. • Michael A. Nielsen (2015), Neural Networks and Deep Learning. Determination Press. Url: http://neuralnetworksanddeeplearning.com/ <p>In addition, for programming tips in Python, students may wish to consult</p> <ol style="list-style-type: none"> 1. Wes McKinney (2013), Python for Data Analysis. Sebastopol, CA: O'Reilly
Module Structure	<p>The module structure consists of four components:</p> <ol style="list-style-type: none"> 1. Preparation for each lecture by reading the assigned material prior to class 2. Attend all tutorials with a laptop with all software installed and ready prior to class 3. Complete all programming assignments and submit them on-time and in the correct format 4. A final exam
Usability in other Modules/Programmes	Subsequent modules
Last Approval Date	2020/02/04

Machine Learning II [INF72041]

Module Coordinator		Nagler, Jan			
Programme(s)		Master in Applied Data Science			
Term		Semester 2 Q4			
Module Duration		1 Semester			
Compulsory/Elective Module		Compulsory Module			
Credits:		6			
Frequency		Annually			
Language		English			
Total Workload	150 h	Academic Teaching Hours:	37	Remaining Workload:	Self-study
		Self-study includes lesson preparation and follow-up activities, reading assignments, assessment preparation, take-home assignments, etc.			
Prerequisites		Quantitative Fundamentals & Machine Learning I			
Content		This course is an introduction to statistical machine learning and probabilistic data analysis involving highly parameterized models. Topics include time series analysis and variational inference.			
Intended Learning Outcomes		<p><i>Knowledge:</i> On the successful completion of this module, students will have thorough hands-on experience implementing with standard statistical machine learning tools, in particular supervised and unsupervised machine learning models.</p> <p>Specifically, their knowledge</p> <ul style="list-style-type: none"> • will deepen and redefine their sophistication in the mathematical and statistical foundations of machine learning • will appraise and evaluate the computational challenges to performing statistical inference on high-dimensional data • can explain and illustrate the role that MCMC and sampling techniques play in approximate Bayesian inference <p><i>Skills:</i></p> <ul style="list-style-type: none"> • can implement sophisticated MCMP methods regression problems; • can compose, construct and operate an ensemble of machine learning techniques to solve a complicated, real-world problem. 			
Forms of teaching, methods and support		Lecture and programming assignments			

Type of Assessment(s) and performance	Type of examination	Duration or length	Performance Points	Due date or date of exam
	Five programming assignments	one week per assignment	70	end of each teaching week, starting week 2
	Final Exam	50 minutes	50	Exam week
	In order to fully assess the students competences in both theory and practice, more than one type of assessment is needed.			
Recommended Literature	Kevin P. Murphy (2012), Machine Learning: A Probabilistic Perspective, MIT Press.			
Module Structure	<ol style="list-style-type: none"> 1. Regression, Regularization & Preprocessing <ol style="list-style-type: none"> a. Correlation-based dimensionality reduction b. Principle Component Analysis (PCA) c. Regularization 2. Bayesian Methods <ol style="list-style-type: none"> a. Latent Variables Models b. Expectation Maximization (EM) c. Variational Inference & Sampling (Gibbs & Metropolis) d. Markow Chain Monte Carlo (MCMC) e. Gaussian Mixture Model 3. Supervised and Unsupervised Learning: Applications, Tools & Libraries 			
Usability in other Modules/Programmes	Co-op Project and thesis			
Last Approval Date	2021/01/18			

**AI & Humanity - Ethics of Data Science
[INF72030]**

Modulkoordinator		Köhler, Sebastian			
Studiengang		Master in Applied Data Science			
Studienabschnitt		4th Quarter			
Moduldauer		1 Semester			
Pflicht- /Wahlpflichtmodul		Pflicht			
Credits:		6			
Häufigkeit des Angebots		Jährlich			
Sprache		Englisch			
Workload:	150 h	Präsenz:	44 h	Selbststudium:	106 h
Voraussetzungen für die Teilnahme		Previous module			
Kurzbeschreibung / Lerninhalte		<p>This module explores ethical and legal challenges and questions that data scientists are likely to face in their professional lives working with and developing emerging information technologies. Issues that will be considered are, for example, privacy, responsibility, fairness, how such technologies impact the flow of information and what increasing automatization might mean for society. Participants will gain an in-depth comprehension of ethical and legal issues surrounding the work of data scientists and emerging information technologies, as well as the crucial ethical and legal questions that we should ask about such technologies. On successful completion of this module, students should have developed and strengthened their analytic and critical skills, as well as their ability to apply those skills to ethical and legal problems to develop solutions to those problems.</p>			

Qualifikationsziele / Lernergebnisse	<p><i>Knowledge:</i> On successful completion of this module, students will have a thorough comprehension of central legal and ethical issues surrounding information technologies, as well as the crucial legal and ethical questions we must ask about such technologies, i.e. they can</p> <ul style="list-style-type: none"> • explain what ethical and legal questions information technologies raise for issues such as privacy, responsibility, or fairness. • articulate what kinds of answers have been given to such ethical and legal questions and how those answer are supported. • compare different responses to the relevant ethical and legal questions. <p><i>Skills:</i> On successful completion of this module, students will be able to identify and evaluate legal and ethical problems related to information technologies, develop and critically assess appropriate responses to such problems, and to assess their own evaluative outlook critically, i.e. they can</p> <ul style="list-style-type: none"> • identify ethical and legal issues that information technologies raise and articulate and defend their own responses to these issues. • critically assess arguments for and against positions taken in response to ethical and legal issues raised by information technologies. • identify and reflect on evaluative assumptions presupposed by arguments made for or against particular uses of information technologies. <p><i>Competencies:</i> On successful completion of this module, students should have developed and strengthened their analytic and critical skills, as well as their ability to apply those skills to ethcial and legal problems to develop solutions to those problems, i.e. they can</p> <ul style="list-style-type: none"> • anticipate and articulate legal and ethical issues that might be raised by novel technologies. • articulate, develop, and defend novel responses on ethical and legal questions that are raised by various technologies. 																				
Lernformen, Methodik und Betreuung	Practical seminar with critical reflection																				
Art der Prüfungsleistungen im Modul und Akkumulationspunkte	<table border="1"> <thead> <tr> <th>Type of Assessment</th> <th>Duration</th> <th>Performance Points</th> <th>Due Date or Date of Exam</th> </tr> </thead> <tbody> <tr> <td>Argumentative exercises</td> <td>tbd</td> <td>30</td> <td>during term</td> </tr> <tr> <td>Discussion essay</td> <td>tbd</td> <td>30</td> <td>during term</td> </tr> <tr> <td>Independently researched essay</td> <td>tbd</td> <td>30</td> <td>during term</td> </tr> <tr> <td>Essay on legal issues</td> <td>tbd</td> <td>30</td> <td>during term</td> </tr> </tbody> </table>	Type of Assessment	Duration	Performance Points	Due Date or Date of Exam	Argumentative exercises	tbd	30	during term	Discussion essay	tbd	30	during term	Independently researched essay	tbd	30	during term	Essay on legal issues	tbd	30	during term
Type of Assessment	Duration	Performance Points	Due Date or Date of Exam																		
Argumentative exercises	tbd	30	during term																		
Discussion essay	tbd	30	during term																		
Independently researched essay	tbd	30	during term																		
Essay on legal issues	tbd	30	during term																		

Literaturhinweise	<ul style="list-style-type: none"> • Boddington, Paula 2017. Towards a Code of Ethics for Artificial Intelligence, Berlin: Springer • Vollmann, Jeff and Matei, Sorin Adam (Eds.) 2016. Ethical Reasoning in Big Data, Berlin: Springer • Lin, Patrick, Jenkins, Ryan and Keith, Abney (Eds.) 2017. Robot Ethics 2.0, Oxford: Oxford University Press • Shafer-Landau, Russ 2015. The Fundamentals of Ethics, Oxford: Oxford University Press
Modulstruktur	<ol style="list-style-type: none"> 1. The Law & AI <ul style="list-style-type: none"> • Data Protection Law • Pioneering in Cyberspace and Cyberlaw 1. Ethics & AI <ul style="list-style-type: none"> • Introduction to Ethics & Philosophical Methodology • Privacy, Anonymity, Consent, and Data Ownership • Algorithms and the Flow of Information: Filter Bubbles and Deception • Fairness, Justice, and Discrimination • Accountability, Explainability and Ethical AI • Automatization and Humanity`s Future
Verwendbarkeit für andere Module und Programme	AI The New Frontier
Letztes Freigabedatum	18.06.2020

Electives

Bank Controlling & Treasury [FIN70722]

Module Coordinator		Heidorn, Thomas			
Programme(s)		MoF			
Term		-			
Module Duration		1 Semester			
Compulsory/Elective Module		Elective Module			
Credits:		6			
Frequency		Annually			
Language		English			
Total Workload	150 h	Academic Teaching Hours:	44	Remaining Workload:	Self-study
		One academic teaching hour corresponds to 40 minutes.			
		Self-study includes lesson preparation and follow-up activities, reading assignments, assessment preparation, take-home assignments, etc.			
Prerequisites		Good understanding of Bank Products Basic Understanding of Capital Market Products (Swap, Swaption, CDS)			

Content	<ul style="list-style-type: none">1. Product pricing<ul style="list-style-type: none">1.1. Interest rate1.2. Default cost1.3. Liquidity cost1.4. Unit cost1.5. Equity cost (regulatory / economic) 2. Interest cost<ul style="list-style-type: none">2.1. Pool method2.2. Matched term principle2.3. Interest margin2.4. Yield curve margin 3. Treasury / Risk management<ul style="list-style-type: none">3.1. Market treasury3.2. Liquidity management3.3. Credit treasury3.4. Behavioral Treasury 4. Bank management<ul style="list-style-type: none">4.1. Risk adjusted performance4.2. Equity management 5. External Specialist (presentations) (short term adjustments are possible)<ul style="list-style-type: none">5.1. Corporate client5.2. European banks business model5.3. Optimizing the bank liquidity5.4. Asset Liability Management5.5. Interest rate risk in the banking book5.6. Digital change in banking5.7. Optimizing the banks capital structure5.8. Basel 3 - 4
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Intended Learning Outcomes	<p><i>Knowledge:</i> On successful completion of this module, students will have a thorough comprehension of the major concepts, approaches and techniques in Bank Controlling and Treasury i.e. they can:</p> <ul style="list-style-type: none"> • Explain the main concepts and techniques of fund transfer prices • Compare and interpret key ratios • Explain the impact of the regulatory framework on banking <p><i>Skills:</i> On successful completion of this module, students will have the proven ability to apply advanced knowledge to efficiently manage a bank, i.e. they can:</p> <ul style="list-style-type: none"> • Analyze the riskiness and profitability of products • Manage risks efficiently • Optimize the equity structure <p><i>Competence:</i> On successful completion of this module, students can take responsibility to transfer these concepts to typical leadership and management situations in banks, such as Treasury and Controlling.</p>			
Forms of teaching, methods and support	Lecture, discussion, case study, discussion with external specialists			
Type of Assessment(s) and performance	Type of examination	Duration or length	Performance Points	Due date or date of exam
	Prepare a business case	10 days	120	TBA
Recommended Literature	<ul style="list-style-type: none"> • Moorad, Choudhry: The Principles of Banking, John Wiley & Sons 2012 			
Module Structure	<p>Understanding and applying the theory in using ratios and transfer prices in managing a bank. Case studies and discussions with external specialists give a state of the art picture of banking focusing on Germany.</p> <p>The module focuses on case studies and Excel exercises to understand the value management of a bank. The special highlight is talks given by bank specialists on the topics.</p>			
Usability in other Modules/Programmes	Other Electives; Master's Thesis			
Last Approval Date	2021/10/07			

**FX Options & Structured Products
[FIN70922]**

Module Coordinator		Wystup, Uwe			
Programme(s)		MoF			
Term		Semester 4			
Module Duration		1 Semester			
Compulsory/Elective Module		Elective Module			
Credits:		6			
Frequency		Annually			
Language		English			
Total Workload	150 h	Academic Teaching Hours:	44	Remaining Workload:	Self-study
		One academic teaching hour corresponds to 40 minutes.			
		Self-study includes lesson preparation and follow-up activities, reading assignments, assessment preparation, take-home assignments, etc.			
Prerequisites		Basic understanding of derivatives; elementary school math; basic programming skills (any language, spreadsheets).			

Content

Fundamentals

- Components of foreign exchange risk: forwards, swaps and vanilla options
- FX options market: who does what and why
- Software solutions: which vendor offers what: Fenics, Super Derivatives, Bloomberg, Volmaster, Murex, ICY, Reuters

Pricing and Hedging in the Black-Scholes model

- Black-Scholes / Merton model in FX
- Derivation of the value of a call and put option
- Detailed discussion of the formula
- Greeks: delta, gamma, theta, rho, vega, vanna, volga, homogeneity and relationships among Greeks

Vanilla Options

- Put-call parity, put-call symmetry, foreign domestic symmetry
- Quotation conventions in FX, ATM and delta-conventions
- Dates: trade day, premium payment day, exercise/expiration time, settlement day
- Settlement, spreads, deal processing, counterparty risk
- Exotic features: deferred payment, contingent payment, deferred delivery, cash-settlement, American and Bermudan exercise rights, cut-offs and fixings
- Market Data: rates, forward points, swap points, spreads

Workshop:

acquaint yourself with pricing software and market quotes

Volatility

- Implied vs. historic
- Quotation in terms of deltas
- Volatility cones
- Volatility smile: term-structure, skew, risk reversals and butterflies
- Volatility sources
- Interpolation and extrapolation across the volatility smile surface: parabolic, SVI, vanna-volga, cubic splines
- Forward volatility

Workshop:

Build your own interpolation tool for volatility smile, calculate Greeks in terms of deltas, hedging volatility risk, deriving the strike from the delta with smile

Structuring with Vanilla Options

- Risk reversal and participating forward
- Spreads and seagulls
- Straddles, strangles, butterflies, condors
- Digital options

Workshop:

Structure your own seagull. Include sales margin. Solve for zero-cost. Calculate delta and vega hedge. Discuss bid-ask spread. Analyze smile effect.

First Generation Exotics: Products, Pricing and Hedging

- Digital options: European and American style, single and double barrier
- Barrier options: single and double, knock-in and knock-out, , KIKOs, exotic barrier options
- Compound and instalment
- Asian options: options on the geometric, arithmetic and harmonic mean
- Power, lookback, chooser, paylater

Workshop:

Hedging a knock-out with a risk reversal. Build your own semi-static hedging tool, discuss forward volatility risk

Applications in Structuring

- Dual currency and other FX-linked deposits
- Structured forwards: shark forward, bonus forward, range-reset forward, etc.
- FX-linked interest rate swaps and cross currency swaps
- Exotic spot and forward trades

Workshop:

Structuring exercises: build structures, solve for zero cost, smile adjustment, bid-ask spreads

Vanna-Volga Pricing

- How higher order derivatives influence the price
- Vanna-volga pricing approach
- Case study: one-touch, one-touch moustache
- Discussion of model risk and alternatives: stochastic local volatility

Workshop:

Pricing of barrier options with smile

Overview of Market Models

- Stochastic volatility models
- Local Volatility: properties, pros and cons
- Stochastic Local Volatility Hybrid models
- Super-Replication of barrier options: using leverage constraints and its first order approximation: the barrier shift. Mixing super-replication and vanna-volga

The Pedigree of Barrier and Touch Options
Workshop and Discussion:

- How to construct the universe of barrier and touch options from key building blocks: vanilla and one-touch.
- Residual risk and limitations.
- Static, semi-static and dynamic hedging approaches.

Single Currency Exotics beyond Standard Barrier Options and Touch Contracts

- Exotic features in (vanilla) options: deferred payment, contingent payment, deferred delivery, cash-settlement, American and Bermudan exercise rights, cut-offs and fixings
- Exotic barrier and touch options
- Faders, corridors, accumulative forwards, target redemption forwards (TRFs)
- Forward start options, step-ups
- Time options
- Variance and Volatility Swaps

Workshop:

Structure and price your own accumulative forward. Smile adjustment. Simulation tool for TRFs. Discussion of TRF hedging

Multi Currency Exotics

- Product overview with applications: quanto options, baskets, spreads, best-ofs, outside barriers
- Correlation: implied correlations, correlation risk and hedging, currency triangles and tetrahedra
- Pricing in Black-Scholes model: analytic, binomial trees and Monte Carlo

Workshop:

Pricing and correlation hedging a two-currency best-of: calculate your own sensitivities and hedge vega and correlation risk.

<p>Intended Learning Outcomes</p>	<p><i>Knowledge:</i> Students will become knowledgeable about the products, conventions, models used in the foreign exchange derivatives market, i. e. they can:</p> <ul style="list-style-type: none"> • Describe brokers' quotes for at-the-money volatilities, risk reversals, butterflies and market strangles • Classify vanilla structures including risk reversals, participators, spreads, straddles, strangles, butterflies, condors, seagulls and calendar spreads • Explain the FX volatility surface • Discuss bid-ask spread <p><i>Skills:</i> Students will learn how to structure hedging solutions for corporate treasury, judge pricing and hedging strategies and implement these in practical situations using spreadsheets/VBA, matlab, or similar, i. e. they can:</p> <ul style="list-style-type: none"> • Build their own interpolation tool for volatility smile, calculate Greeks in terms of deltas, hedging volatility risk, derive the strike from the delta with smile • Structure their own seagull. Include sales margin. Solve for zero-cost. Calculate delta and vega hedge. Analyse smile effect • Hedge a knock-out with a risk reversal. Build their own semi-static hedging tool, discuss forward volatility risk • Price barrier options with smile. <p><i>Competences:</i> Students will be able to judge which product to use in which situation, how to price the building blocks, how to decompose complex solutions into building blocks. Students will be able to understand the difference between hedging and speculation. The module requires that students will</p> <ul style="list-style-type: none"> • organize themselves in team work • guide decision making in groups • present the results of their case studies to their peers 								
<p>Forms of teaching, methods and support</p>	<ul style="list-style-type: none"> • Lecture, in-class exercises, guest lectures, case studies, project work. • Lectures are based on several papers. Professor Wystup provides a set of lecture notes and these papers. 								
<p>Type of Assessment(s) and performance</p>	<table border="1" data-bbox="480 1653 1378 1839"> <thead> <tr> <th>Type of examination</th> <th>Duration or length</th> <th>Performance Points</th> <th>Due date or date of exam</th> </tr> </thead> <tbody> <tr> <td>Group Presentation of Projects</td> <td>60 min</td> <td>120</td> <td>Last two days of class</td> </tr> </tbody> </table>	Type of examination	Duration or length	Performance Points	Due date or date of exam	Group Presentation of Projects	60 min	120	Last two days of class
Type of examination	Duration or length	Performance Points	Due date or date of exam						
Group Presentation of Projects	60 min	120	Last two days of class						

Recommended Literature	<ul style="list-style-type: none"> • Wystup: Lecture Notes (provided as pdf) • Wystup: FX Options and Structured Products, 2nd Edition, Wiley 2017 • Hakala/Wystup: Foreign Exchange Risk, Risk Publications, 2002 • Any of Wystup's FX related papers, which can be found on https://www.mathfinance.com/company/publications/ in particular: <ul style="list-style-type: none"> • A Guide to FX Options Quoting Conventions by Uwe Wystup and Dimitri Reiswich in The Journal of Derivatives, Winter 2010, Vol. 18, No. 2: pp. 58-68 • Foreign Exchange Options – A Trader's View, joint with Markus Cekan and Armin Wendel, Contribution to Encyclopedia of Quantitative Finance, John Wiley & Sons Ltd. Chichester, UK. 2010. pp.727-731 • Pricing Formulae for Foreign Exchange Options, joint with Andreas Weber, Contribution to Encyclopedia of Quantitative Finance, John Wiley & Sons Ltd. Chichester, UK. 2010. pp.1408-1418 • Vanna-Volga Pricing, Contribution to Encyclopedia of Quantitative Finance, John Wiley & Sons Ltd. Chichester, UK. 2010. pp. 1867-1874 • Foreign Exchange Symmetries, Contribution to Encyclopedia of Quantitative Finance, John Wiley & Sons Ltd. Chichester, UK. 2010. pp.752-759 • Quanto Options, Contribution to Encyclopedia of Quantitative Finance, John Wiley & Sons Ltd. Chichester, UK. 2010. pp. 1455-1460 • Foreign Exchange Smile Interpolation, Contribution to Encyclopedia of Quantitative Finance, John Wiley & Sons Ltd. Chichester, UK. 2010. pp.742-745 • The market price of one-touch options in foreign exchange markets, Derivatives Week Vol. XII, no. 13, p. 8-9, London 2003 • Dealing with dangerous digitals, joint with Steven E. Shreve and Uwe Schmock, Foreign Exchange Risk, Risk Publications, London 2002 • Efficient computation of option price sensitivities using homogeneity and other tricks, joint with Oliver Reiss, The Journal of Derivatives Vol. 9 No. 2, Winter 2001,
Module Structure	The module consists of one block (Mon-Fri). Students are tested on their learning progress through a group project (4 students per group) on which they work during the week and that will be presented the end of the module. Every student has to present a part of the group project.
Usability in other Modules/Programmes	Other Electives, Master's Thesis
Last Approval Date	2021/09/22

**Insights into Manufacturing Industry
[MGT71462]**

Module Coordinator		Thun, Jörn-Henrik			
Programme(s)		MiM			
Term		Semester 4			
Module Duration		1 Semester			
Compulsory/Elective Module		Elective Module			
Credits:		6			
Frequency		Annually			
Language		English			
Total Workload	150 h	Academic Teaching Hours:	44	Remaining Workload:	Self-study
		One academic teaching hour corresponds to 40 minutes.			
		Self-study includes lesson preparation and follow-up activities, reading assignments, assessment preparation, take-home assignments, etc.			
Prerequisites		Operations Management			
Content		<p>Covered industries are the following: Automotive Industry, Steel Industry, Machinery Industry, Electronics Industry, Pharmaceutical Industry, Chemical Industry, Aviation Industry, Food Industry, Apparel Industry, Defense Industry, Oil Industry & Energy Sector, Beverage Industry, Agricultural Industry, Furniture Industry, Tobacco Industry, Cosmetics Industry (subject to change)</p> <p>Hence, profound knowledge about the particularities of the respective industry is important for managers of all disciplines, not only for those with a specialization in manufacturing. However, this course is particularly interesting for students who are</p> <ul style="list-style-type: none"> • interested in the manufacturing industry • want to learn about important business developments, or • want to get a deeper understanding of several industries 			

<p>Intended Learning Outcomes</p>	<p>Knowledge: The main purpose of this course is to give insights into different industries . On successful completion of this module students can:</p> <ul style="list-style-type: none"> • illustrate the developments within the industry, describe typical products • depict a typical supply chain of a company • illustrate a typical production process for specific products • identify global players and key suppliers • understand relevant customer requirements • reflect about ethical aspects such as CO2 emissions • illustrate the potential of Industry 4.0 for manufacturing companies <p>Skills: Students will be able to analyse the business environment within the industry they are acting in. On successful completion of this module students can:</p> <ul style="list-style-type: none"> • assess the specific situation a company has to deal with within the particular industry • consider and evaluate diverse perspectives of a company and important decision domains in the specific business context <p>Competence: After the successful completion of this module, students will acquire competence to</p> <ul style="list-style-type: none"> • prepare essential decisions in the respective business environment 																
<p>Forms of teaching, methods and support</p>	<p>Teaching in this module is primarily based on case studies to give students a practical, hands-on experience.</p> <p>Students need to be prepared to be an active and well-prepared participant of the module and contribute regularly to in-class discussions!</p>																
<p>Type of Assessment(s) and performance</p>	<table border="1"> <thead> <tr> <th>Type of Examination</th> <th>Duration or Length</th> <th>Performance Points</th> <th>Due Date or Date of Exam</th> </tr> </thead> <tbody> <tr> <td>Group presentations</td> <td>45 min</td> <td>90</td> <td>During the module</td> </tr> <tr> <td>Discussions</td> <td>15 min</td> <td>15</td> <td>During the module</td> </tr> <tr> <td>Written group assignment</td> <td>5 pages</td> <td>15</td> <td>End of the module</td> </tr> </tbody> </table>	Type of Examination	Duration or Length	Performance Points	Due Date or Date of Exam	Group presentations	45 min	90	During the module	Discussions	15 min	15	During the module	Written group assignment	5 pages	15	End of the module
Type of Examination	Duration or Length	Performance Points	Due Date or Date of Exam														
Group presentations	45 min	90	During the module														
Discussions	15 min	15	During the module														
Written group assignment	5 pages	15	End of the module														
<p>Recommended Literature</p>	<p>Business Reports, newspaper articles, statistics, etc.</p>																

Module Structure	Lectures will be scheduled throughout the semester. In the module, students will prepare one presentation on a particular industry. Since a final exam at the end of the semester is not planned, individual performance and participation in group work concerning the presentation, the discussion and the written assignment will be essential for the final grade.
Usability in other Modules/Programmes	Other Electives; Master's Thesis
Last Approval Date	2021/09/30

**Numerical Analysis of Dynamical systems
[MGT63446]**

Module Coordinator		Böttcher, Lucas			
Programme(s)		MADS			
Term		Semester 4			
Module Duration		1 Semester			
Compulsory/Elective Module		Elective Module			
Credits:		6			
Frequency		Annually			
Language		English			
Total Workload	150 h	Academic Teaching Hours:	44	Remaining Workload:	Self-study
		One acadmic teaching hour corresponds to 40 minutes.			
		Self-study includes lesson preparation and follow-up activities, reading assignments, assessment preparation, take-home assignments, etc.			
Prerequisites		calculus; linear algebra; programming essentials (Python)			
Content		Many natural and engineered systems are dynamic and are characterized by internal variables that change with time. Describing the quantitative and qualitative features of this change is the topic of dynamical systems theory. Dynamical systems arise naturally in virtually all scientific disciplines including physics, biology, chemistry and finance. This course is a broad introduction to dynamical systems theory and their numerical analysis.			
Intended Learning Outcomes		The goal of this course is to provide students an introduction to dynamical systems and to develop a solid understanding of their fundamental properties. The theory will be developed systematically, focusing on analytical methods for low dimensional systems, geometric intuition, and numerical analysis methods for application examples from different disciplines including finance. Computer simulations using Python will be used to demonstrate various concepts.			
Forms of teaching, methods and support		Lecture with in-class and home assignments.			

Type of Assessment(s) and performance	<table border="1"> <thead> <tr> <th data-bbox="480 338 700 450">Type of examination/assessment</th> <th data-bbox="700 338 935 450">Duration or length</th> <th data-bbox="935 338 1155 450">Performance Points</th> <th data-bbox="1155 338 1375 450">Due date or date of exam</th> </tr> </thead> <tbody> <tr> <td data-bbox="480 450 700 528">oral exam</td> <td data-bbox="700 450 935 528">20 min</td> <td data-bbox="935 450 1155 528">120</td> <td data-bbox="1155 450 1375 528">during the exam week</td> </tr> </tbody> </table>	Type of examination/assessment	Duration or length	Performance Points	Due date or date of exam	oral exam	20 min	120	during the exam week
Type of examination/assessment	Duration or length	Performance Points	Due date or date of exam						
oral exam	20 min	120	during the exam week						
Recommended Literature	Recommended literature: <ul style="list-style-type: none"> • Stuart, Andrew, and Anthony R. Humphries. Dynamical systems and numerical analysis. Vol. 2. Cambridge University Press, 1998. • Strogatz, Steven H. Nonlinear dynamics and chaos with student solutions manual: With applications to physics, biology, chemistry, and engineering. CRC press, 2018. • Böttcher, Lucas and Hans J. Herrmann. Computational Statistical Physics. Cambridge University Press, 2021. 								
Module Structure	Lectures will cover the following concepts: <ul style="list-style-type: none"> • a dynamical view of the world • the importance of nonlinearity • solutions of differential equations • solving equations on the computer • phase diagrams • fixed points and stability • linear stability analysis • classifications of linear systems • Lyapunov functions and nonlinear stability • cycles and oscillations • bifurcations and bifurcation diagrams 								
Usability in other Modules/Programmes	All quantitative modules in the following semesters.								
Last Approval Date	2021/10/04								

**Quantitative Trading and Analysis with
Python [FIN70972]**

Module Coordinator		Vilkov, Grigory			
Programme(s)		MoF			
Term		Semester 4			
Module Duration		1 Semester			
Compulsory/Elective Module		Elective Module			
Credits:		6			
Frequency		Annually			
Language		English			
Total Workload	150 h	Academic Teaching Hours:	44	Remaining Workload:	Self-study
		One acadmic teaching hour corresponds to 40 minutes.			
		Self-study includes lesson preparation and follow-up activities, reading assignments, assessment preparation, take-home assignments, etc.			
Prerequisites		Recommended: successful completion of the modules Quantitative Portfolio Management or Portfolio Risk Management, or possession of comparable understanding and skills in the area of portfolio allocation methods, factor models, optimization techniques, statistics and econometrics.			
Content		<ol style="list-style-type: none"> 1. Principles and practice of data manipulation in Python (import, storage, preparation for quantitative trading systems), using Pandas and selected APIs for data access 2. Principles and development of trading systems, with emphasis on low frequency (not low-latency algo trading systems) quantitative trading 3. Python as language/ platform of choice for quantitative trading 4. Examples of trading systems/ path to developing a portfolio allocation/ trading system/ course project to develop a particular trading system 			
Intended Learning Outcomes		<p>By the end of the course the students will be able to develop a quantitative trading system, including</p> <ol style="list-style-type: none"> 1. Identification of an idea for trading using academic literature 2. Formulation of an algorithms 3. Identification of data needs, creating, cleaning, and preparing data for the system 4. Programming a system prototype (using Python environment) 5. Backtesting and anslysis of the quantitative trading system 			

Forms of teaching, methods and support	Lectures with theoretical and practical examples Programming assignments in class and at home Group project involving development of a quantitative trading strategy, its implementation, and description of results (with a short presentation in the class if time permits)																			
Type of Assessment(s) and performance	<table border="1"> <thead> <tr> <th>Type of Assessment</th> <th>Duration</th> <th>Performance Points</th> <th>Due Date/ Date of Exam</th> </tr> </thead> <tbody> <tr> <td>Home assignments (one individual and one group)</td> <td>10 hours</td> <td>40</td> <td>during the course</td> </tr> <tr> <td>Course project (group)</td> <td>20 hours</td> <td>30</td> <td>Last week of the module</td> </tr> <tr> <td>Written exam</td> <td>50+10 min</td> <td>50</td> <td>Exam week</td> </tr> </tbody> </table>				Type of Assessment	Duration	Performance Points	Due Date/ Date of Exam	Home assignments (one individual and one group)	10 hours	40	during the course	Course project (group)	20 hours	30	Last week of the module	Written exam	50+10 min	50	Exam week
Type of Assessment	Duration	Performance Points	Due Date/ Date of Exam																	
Home assignments (one individual and one group)	10 hours	40	during the course																	
Course project (group)	20 hours	30	Last week of the module																	
Written exam	50+10 min	50	Exam week																	
Recommended Literature	Technical documentation for Python and selected packages (numpy, pandas, scipy, and some others) Lecture slides Additional materials can be specified on the course page in Canvas before the start of the course																			
Module Structure	The course is built as an experiential learning module and focuses on the completion of a course project. Two homework assignments are designed to deliver necessary data and skills for the course project, and the lectures are designed to provide students with the necessary knowledge and skills, including tools for data preparation and analysis, for the completion of the final tasks. The lecture hours are split between lecturing and programming together or under the supervision of an instructor.																			
Usability in other Modules/Programmes	The course provides a natural path to the master thesis work																			
Last Approval Date	2021/09/22																			

Renewable Energy Finance [FIN70952]

Module Coordinator		Moslener, Ulf			
Programme(s)		MoF, MiM			
Term		Semester 4			
Module Duration		1 Semester			
Compulsory/Elective Module		Elective Module			
Credits:		6			
Frequency		Annually			
Language		English			
Total Workload	150 h	Academic Teaching Hours:	44	Remaining Workload:	Self-study
		One academic teaching hour corresponds to 40 minutes.			
		Self-study includes lesson preparation and follow-up activities, reading assignments, assessment preparation, take-home assignments, etc.			
Prerequisites		Previous modules; basic economics; basic finance			
Content		This module enables you to put a project idea / technology into context: environmental, technological, regulatory. Based on this, you will learn how to use standard finance tools - notably project finance - to make considered assessments and suggestions about financing approaches that reflect the true specificity of the underlying issues related to renewable energy infrastructure investment.			

Intended Learning Outcomes	<p><i>Knowledge:</i> Students acquire a rich factual knowledge of the specifics of renewable energy markets, i. e. they are able to</p> <ul style="list-style-type: none"> • describe the underlying technologies • explain the market mechanisms and financing requirements and • discuss the politics including the portfolio of investment support instruments <p><i>Skills:</i> Students will be able to evaluate the immediate consequences of the specifics of the respective markets, i.e. they are able to</p> <ul style="list-style-type: none"> • analyse market designs and support mechanisms • analyse the basics of a project finance transaction <p><i>Competence:</i> Students will have the ability to make comprehensive, multi-disciplinary assessments of choices in the development and implementation of renewable energy in power production, i. e. they are able to</p> <ul style="list-style-type: none"> • prepare project investment decisions • reflect the impact of policy instruments on such a decision • communicate complex policy and financing issues with a view to support decision making 																
Forms of teaching, methods and support	Interactive lectures. Support through E-learning elements. Cases and specialist readings.																
Type of Assessment(s) and performance	<table border="1" data-bbox="480 1178 1378 1592"> <thead> <tr> <th>Type of examination</th> <th>Duration or length</th> <th>Performance Points</th> <th>Due date or date of exam</th> </tr> </thead> <tbody> <tr> <td>Short final exam</td> <td>40 min</td> <td>40</td> <td>end of semester</td> </tr> <tr> <td>In-class Presentation in groups (including commented slides)</td> <td>10-15 min + Discussion</td> <td>60</td> <td>during the course</td> </tr> <tr> <td>Contribution to discussion forum (Canvas)</td> <td>chat contribution</td> <td>20</td> <td>during the course</td> </tr> </tbody> </table> <p>The exam will be a closed book exam</p>	Type of examination	Duration or length	Performance Points	Due date or date of exam	Short final exam	40 min	40	end of semester	In-class Presentation in groups (including commented slides)	10-15 min + Discussion	60	during the course	Contribution to discussion forum (Canvas)	chat contribution	20	during the course
Type of examination	Duration or length	Performance Points	Due date or date of exam														
Short final exam	40 min	40	end of semester														
In-class Presentation in groups (including commented slides)	10-15 min + Discussion	60	during the course														
Contribution to discussion forum (Canvas)	chat contribution	20	during the course														
Recommended Literature	Specialised articles and Reports																

Module Structure	<p>Block I / Market Environment:</p> <ul style="list-style-type: none"> • Regulatory Environment • Climate Change & Climate Policy • Energy Economics • Renewable Energy: Technologies & Markets <p>Block II / Financing:</p> <ul style="list-style-type: none"> • Financing Projects • Financing Instruments (Public and Private) • Cases (e.g. Hydro/Wind) • Student Cases/Presentations (e.g. relevant real world projects, innovative financing schemes, cash flow ...) • Latest trends in international climate finance
Usability in other Modules/Programmes	Other Electives, Master`s Thesis
Last Approval Date	2021/10/07

Strategic Business Modelling [MGT70882]

Module Coordinator		Strohhecker, Jürgen			
Programme(s)		MoF, MiM			
Term		Semester 4			
Module Duration		1 Semester			
Compulsory/Elective Module		Elective Module			
Credits:		6			
Frequency		Annually			
Language		English			
Total Workload	150 h	Academic Teaching Hours:	44	Remaining Workload:	Self-study
		One academic teaching hour corresponds to 40 minutes.			
		Self-study includes lesson preparation and follow-up activities, reading assignments, assessment preparation, take-home assignments, etc.			
Prerequisites		Basic business knowledge (no prior computer modelling experience is needed). Preparation of selected textbook chapters in advance of class.			
Content		<p>Every organisation – for profit or not-for-profit – has a business model that describes the rational of how it creates, delivers, and captures value as an important part of the organisation’s strategy. Designing and re-designing the business model is a crucial task of an organisation’s management that is very often not adequately supported by state-of-the-art methods. This module introduces a dynamic business modelling approach that is grounded in the rigorous, scientific method of system dynamics, which was developed at MIT Sloan School in the 1960s by computer pioneer Jay Forrester and successfully applied in diverse industries and organizations, such as Airbus, Commerzbank, Lufthansa, RWE, and Volkswagen. It introduces the techniques required to build models that work and are useful; more precisely, that do what the real-world data says is actually happening, that show how the future may play out, and then allow testing if and how new ideas might improve performance. Through intensive, hands-on sessions and interactive games, participants will be exposed to the principles of dynamic modelling and thorough analysis, which they can apply to their own business environment as soon as they complete the course.</p>			

<p>Intended Learning Outcomes</p>	<p><i>Knowledge:</i> Upon completion of this module students will have extended knowledge of</p> <ul style="list-style-type: none"> • the challenges that managers face in complex dynamic business systems • how an organisation's resources drive its performance • the system dynamics modelling and simulation method which supports managers in improving their organisation's business model <p><i>Skills:</i> Participants will have the skills:</p> <ul style="list-style-type: none"> • to identify complex dynamic challenges • develop, parameterize, test and analyse small to medium-scale business simulation models using a user-friendly software • to present and communicate insights derived from working with a model to an interested audience <p><i>Competence:</i> Participants will increase their ability to successfully tackle dynamically complex problems. The concepts and frameworks covered in this module will enable participants to (inter alia)</p> <ul style="list-style-type: none"> • develop the ability to think systemically and dynamically • understand why dysfunctional dynamics persist in organizations • conceive why success in one area often means trouble for other areas • assess in advance the likely impact of different policies and decisions on an organization's performance
<p>Forms of teaching, methods and support</p>	<p>Teaching formats include:</p> <ul style="list-style-type: none"> • Self-study elements, specifically videos and readings in advance of class • Interactive game session • Modelling exercises • Case studies (group work) • Coaching <p>Participants will often work in small groups with close interaction with the lecturer. Teaching builds on the idea that system dynamics is best acquired through learning by doing, i.e. through applying it to various hands-on challenges.</p>

Type of Assessment(s) and performance	Type of examination	Duration or length	Performance Points	Due date or date of exam
	Modelling and simulation exam	2 h	50	During the module
	Case studies (group)	12 h	30	During the module
	Modelling and simulation project (group)	12 h	40	During the module
<p>The modelling and simulation exam includes small-scale, practical modelling and simulation exercises with a modern browser-based simulation software. It also covers the content of pre-reading materials (multiple choice test).</p> <p>The category “case studies” comprises several cases that are embedded in the course. Two case studies are related to the two business games included in the course.</p> <p>The modelling and simulation project requires to conduct a simulation study including model development, validation, simulation, analysis, and presentation of findings. Assessment comprises a management-oriented presentation, a (well-documented) model and all simulation scenarios analysed.</p> <p>A computer running a current browser is required. Access to the simulation software used in this course will be provided.</p> <p>All exams are included in the block week.</p>				
Recommended Literature	<ul style="list-style-type: none"> • Kim Warren: Strategy Dynamics Essentials, 2nd ed., Strategy Dynamics Ltd, 2015 (ebook will be provided) • Cases 			

Module Structure	<p>The module is organised as a block week. Sessions typically run from 9 a.m. to 4:30 p.m. during the week and from 9 a.m. to 12:15 p.m. on Saturday. Additional time for case and group work preparation might be needed in the evening. The structure is as follows:</p> <p>Session Typ Content</p> <ul style="list-style-type: none"> 1 Business Game FishBanks Ltd 2 Lecture 1 Resources drive performance over time Case 1 Sustainable business development: The fishery industry challenge 3 Case 1, MSE Sustainable business development: The fishery industry challenge Modelling and simulation exam part I (multiple choice test) Lecture 2 Resources won and lost 4 Lecture 3 Resource interdependence and strategic architecture Case 2 Forecasting with diffusion models 5 Case 2 Forecasting with diffusion models Lecture 4 Resource quality and resource chains 6 Lecture 5 Steering strategy and performance Case 3 Strategy design and evaluation (business game included) 7 Case 3 Strategy design and evaluation (business game included) 8 Group project Analysis of a dynamic business challenge 9 Group project Analysis of a dynamic business challenge 10 Group project Analysis of a dynamic business challenge MSE Modelling and simulation exam part II (in-class exam) 11 Group Project Analysis of a dynamic business challenge
Usability in other Modules/Programmes	Other Electives; Master's Thesis
Last Approval Date	2021/09/22

**Design and Management of Hierarchies
[MGT73782]**

Module Coordinator		Billinger, Stephan			
Programme(s)		MSc MiM			
Term		Semester 4			
Module Duration		1 Semester			
Compulsory/Elective Module		Concentration Module			
Credits:		6			
Frequency		Annually			
Language		English			
Total Workload	150 h	Academic Teaching Hours:	44	Remaining Workload:	Self-study
		One academic teaching hour corresponds to 40 minutes.			
		Self-study includes lesson preparation and follow-up activities, reading assignments, assessment preparation, take-home assignments, etc.			
Prerequisites		Business Economics; Strategic Management			
Content		<p>The module Organisational Design introduces key principles and methods used for designing effective organisations. It focuses in tradeoffs associated with the design and adaptation of cooperation and coordination in teams, departments, business units, and large corporations. The module builds on economic and behavioural perspectives and introduces classic as well as contemporary approaches to organisation design. The module combines case analyses, conceptual and problem-driven discussions, as well as teaching simulations, in order to offer a compelling introduction to managerial challenges in organisational design.</p>			

<p>Intended Learning Outcomes</p>	<p><i>Knowledge:</i> On successful completion of this module, students will have a thorough comprehension of principal concepts and theories in organisational design, i.e. they can:</p> <ul style="list-style-type: none"> • Describe the key trade-offs that occur when designing organisations • Outline how organisation design influences differentiation and integration • Explain how organisation design affects the motivation of organisational members <p><i>Skills:</i> On successful completion of this module, students will have the proven ability to apply principal knowledge in organisational design and to solve managerial problems, i.e. they can:</p> <ul style="list-style-type: none"> • Analyse how the organisational design aligns with the strategy and balances routine and innovation • Derive organisational design criteria from a strategy • Diagnose organisational shortcomings • Develop and evaluate alternative organisational designs <p><i>Competencies:</i> On successful completion of this module, students can take responsibility to improve organisational performance, i.e. they can:</p> <ul style="list-style-type: none"> • Design interventions to improve organisational performance • Design an effective organisation within its market niche and review its business performance for sustainability • Capture and document the organisational design and performance assessment to support the agility for change of organisations • Discuss trade-offs in organisational design 																
<p>Forms of teaching, methods and support</p>	<p>Lectures, classroom discussion, case studies, classroom experiments and teaching simulations. Lectures will be scheduled in blocks. A high degree of student involvement is expected.</p>																
<p>Type of Assessment(s) and performance</p>	<table border="1"> <thead> <tr> <th>Type of examination</th> <th>Duration or length</th> <th>Performance Points</th> <th>Due date or date of exam</th> </tr> </thead> <tbody> <tr> <td>Class participation</td> <td>Throughout the module</td> <td>30</td> <td>During the module</td> </tr> <tr> <td>Group project</td> <td>15 minutes</td> <td>40</td> <td>During the module</td> </tr> <tr> <td>Take-home exam</td> <td>5h</td> <td>50</td> <td>During the module</td> </tr> </tbody> </table>	Type of examination	Duration or length	Performance Points	Due date or date of exam	Class participation	Throughout the module	30	During the module	Group project	15 minutes	40	During the module	Take-home exam	5h	50	During the module
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Class participation	Throughout the module	30	During the module														
Group project	15 minutes	40	During the module														
Take-home exam	5h	50	During the module														

Recommended Literature	<p>Gareth R. Jones, <i>Organizational Theory, Design, and Change</i>, 7th edition, Pearson 2013</p> <p>Phanish Puranam, Bart Vanneste, <i>Corporate Strategy: Tools for Analysis and Decision-Making</i>, Cambridge University Press, 2016.</p> <p>James G. March, <i>A Primer on Decision-Making: How Decisions Happen</i>. The Free Press 1994</p> <p>Robert Grant, <i>Contemporary Strategy Analysis (combined text and cases)</i>, John Wiley & Sons, Inc., 9th edition, 2016</p>
Module Structure	<ol style="list-style-type: none"> 1. Organisation Design <ol style="list-style-type: none"> a. On the Nature of Organisation b. Organisation Design and Archetypes 2. Macro-level Organisation Design <ol style="list-style-type: none"> a. Corporate Strategy and Business Strategy b. The Corporate Headquarters and Value Chain Design 3. Micro-level Organisation Design <ol style="list-style-type: none"> a. Specialization and Coordination b. Authority, Delegation and Control 4. Organisation Design: Latest trends <ol style="list-style-type: none"> a. Teaching simulation b. New forms of organisation 5. Organisational Culture and Change <ol style="list-style-type: none"> a. Creating and Managing Organisational Culture b. Types and Forms of Organisational Change c. Competencies and Technology adoption d. Innovation and Ambidexterity 6. Case Presentations 7. Course Summary
Usability in other Modules/Programmes	Master's Thesis
Last Approval Date	2021/10/07

Advanced Mergers & Acquisitions [FIN70942]

Module Coordinator		Hirst, Simon			
Programme(s)		MoF			
Term		Semester 4			
Module Duration		1 Semester			
Compulsory/Elective Module		Elective Module			
Credits:		6			
Frequency		Annually			
Language		English			
Total Workload	150 h	Academic Teaching Hours:	44	Remaining Workload:	Self-study
		One academic teaching hour corresponds to 40 minutes.			
		Self-study includes lesson preparation and follow-up activities, reading assignments, assessment preparation, take-home assignments, etc.			
Prerequisites		Principles or Foundations of Finance / Bachelor Degree in Business; Intermediate level Excel Modelling skills; Familiarity with key concepts of Accounting; either Participation in Case Studies in Investment Banking course or Mergers & Acquisitions Elective course			

Content	<ul style="list-style-type: none">• Brief review of key numerical concepts of M & A and Valuation• Explanation of “Three Dimensional Analysis” and the creation of fully dynamic iterative and circular financial models in Excel, up to the advanced level used in the leading investment banks and private equity firms• Creation of a fully fledged Merger & Acquisition model in Excel with imbedded Three Dimensional Architecture for the Bidder, the Target and the Combined, using real companies as the Bidder and Target. This will be more advanced than the model used in the Mergers & Acquisitions Elective• Once the model has been explained and built, the class will form into groups of their own choosing to construct a certain part of the model themselves and input data for two entirely different companies• To the extent that time allows, there is the possibility of adjusting the model so as to use it to analyse LBO and Restructuring transactions• The Groups will work independently in some of the afternoon sessions and will be mentored by the Professor. The Class will discuss structural and financial issues to do with this example and the Groups will present their project in front of the Class for the Group Case Study Exam – this will require some deal structuring in Excel
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<p>Intended Learning Outcomes</p>	<p><i>Knowledge:</i> Upon successful completion of this module, students will gain knowledge about the process of analyzing M&A transactions, i.e. they will:</p> <ul style="list-style-type: none"> • Understand the key concepts and the mathematical relationships that drive the analysis of M&A transactions at an advanced level, combining knowledge of Business, Accounting & Finance • Understand the concept of three dimensional analysis as it relates to M&A and the construction of fully dynamic financial statements at an advanced level (for Bidder, Target and Combined) • Understand how an advanced financial model is used within corporations, investment banks and private equity firms <p>Upon successful completion of this module, students will be able to apply the knowledge they have gained above in the following manner:</p> <ul style="list-style-type: none"> • Be able to construct three dimensional analysis with minimal supervision • Be able to complete a fully dynamic M&A model using Bidder and Target data from a blank template • Be capable of handling this analysis in relation to any industrial/consumer products company (i.e. not banks or financial institutions which have more complex regulatory parameters) • Begin to be able to adapt models for any end-use with senior management <p><i>Competencies:</i> Upon successful completion of this module, students will have the confidence and knowledge to build very sophisticated financial models using the exact same methodology as that used by the major Wall Street investment banks and private equity houses. This should put students in an advantageous position if they want to pursue a career in investment banking, private equity, management consulting, corporate finance within a major company, or entrepreneurial activities – including the interview process.</p>
<p>Forms of teaching, methods and support</p>	<p>Lectures, in-class Excel analysis and model building performed by students (but with direct guidance from the professor), possible analytical case studies, students' presentations and mentoring of Groups by the Professor.</p>

Type of Assessment(s) and performance	Type of examination	Duration or length	Performance Points	Due date or date of exam
	Group case analysis, presentation and paper	20 minutes per group	70	Saturday morning
	Individual Multiple Choice exam	30 minutes	30	Exam week
	Individual Excel quiz	20 minutes	20	Friday afternoon
	<ul style="list-style-type: none"> • Details regarding the assessments will be given in the first lecture • The assessments have the potential for a maximum 120 points in total • <i>Students need to bring a laptop to every class with Excel software installed</i> • The Group Case exam will involve groups of students evaluating a specific M&A situation and presented by them in class in a 20-minute slide presentation summarizing issues relating to the transaction, in accordance with a list of questions distributed in advance. In parallel, each group will submit their Excel model of the Case Study, based on the template taught in class. This exam accounts for 70 points, with grading being based on the answers to the specific questions, and the quality of the verbal presentation, the slides and the Excel model. • The Individual Multiple Choice Exam is an individual test taken in Exam Week. There will be 30 questions to be answered in 30 minutes. Each question has 4 possible answers, only 1 of which is correct. Each correct answer gets 1 point, with no deductions for wrong answers. No Excel calculations will need to be made in the multiple choice, but there will be questions on specific issues relating to the use of Excel and its appropriate architecture in a financial model. • The Individual Excel Quiz will involve students re-creating a specific schedule in Excel, based upon a template taught in class. 			
Recommended Literature	<ul style="list-style-type: none"> • Hirst, Simon: 3-D Concept Course Notes (2017) • Hirst, Simon: Model Structure Course Notes (2017) <p>These notes are extensive and so take the place of all other course related materials. Both documents will be distributed to all participants in advance of the course.</p>			
Module Structure	Please see content.			

Usability in other Modules/Programmes	The Case Studies in Investment Banking course (November '19) and the elective Mergers & Acquisitions (March '20) , both taught by Prof. Hirst, provide qualification for this Advanced M&A elective course, taking place in a block week in early May 2020.
Last Approval Date	2021/10/07

**Applying Artificial Intelligence in Business
[MGT70582]**

Module Coordinator		Szertics, Gergely			
Programme(s)		MoF, MiM; MADS			
Term		Semester 4			
Module Duration		1 Semester			
Compulsory/Elective Module		Elective Module			
Credits:		6			
Frequency		Annually			
Language		English			
Total Workload	150 h	Academic Teaching Hours:	44	Remaining Workload:	Self-study
		One acadmic teaching hour corresponds to 40 minutes.			
		Self-study includes lesson preparation and follow-up activities, reading assignments, assessment preparation, take-home assignments, etc.			
Prerequisites		No technical skills are needed for the course.			
Content		<p>The course is giving you an overview of how artificial intelligence (AI) as a technology affects business. Some are referring to AI as similarly transformative as electricity or the internet. The course is going to walk you through the different business areas and give you insights about what technologies can be used to improve business efficiency.</p> <p>The course is not giving any coding skills, it only reflects the technology through metaphors. We want you to become a bridge between business needs and technology solutions, not technology architects.</p> <p>We are going to cover the following questions:</p> <ul style="list-style-type: none"> • What is Artificial Intelligence? • How does AI learn, and why does it need so much data? • How does the AI market build up (vendors, platform providers, development frameworks) • How does AI affect different business functions? • How does AI transform the specific processes, and what use-cases are there for each segment? • Why AI is disruptive and how it affects business models? • How to identify AI opportunities in a specific business process and how to build a business case around its implementation? 			

<p>Intended Learning Outcomes</p>	<p><i>Knowledge:</i> On completion of this module, you will know about the basic concepts of how artificial intelligence works and can be applied. You will be able to:</p> <ul style="list-style-type: none"> • understand the key notions regarding AI (machine learning, deep learning, supervised learning, unsupervised learning, reinforcement learning) • list typical applications of different modalities of AI (image processing, voice processing, natural language processing, numerical data processing) • describe the key effects of AI to specific business processes (sales, marketing, customer service, manufacturing, supply chain management) <p><i>Skills:</i> On successful completion of the course you will have the ability to create materials for business decisions based on horizontal market understanding. You will be able to:</p> <ul style="list-style-type: none"> • showcase AI vendors for all above business areas and describe the AI behind the service • discuss the make or buy dilemma and distinguish between off the shelf AI products, AI platforms and AI development frameworks • explain how AI learns, what data it needs and why feedback loop is important for it <p><i>Competences:</i> With the acquired skills and knowledge, you will achieve abilities to evaluate AI against business problems and define which technologies could be the best to address them. In the following situations you will be able to:</p> <ul style="list-style-type: none"> • evaluate a specific business processes and propose specific AI based technology implementations for efficiency improvements • discuss the disruptive potential of AI in key industries (retail, manufacturing, healthcare) • construct a map of AI opportunities for a specific organization and estimate business impact • elaborate and pitch business suggestions to a board about AI investments
<p>Forms of teaching, methods and support</p>	<p>The basic teaching form will be lectures with a lot of integrated case studies.</p>

Type of Assessment(s) and performance

Type of examination	Duration or length	Performance Points	Due date or date of exam
Class preparation / participation	ongoing	30	Throughout the module
Exam for key concepts	30 minutes	30	The beginning of the 9th module
Pitch competition	3 hours	30	11th module
Elaboration of a map of opportunities for a use case	Homework	30	2 weeks after the end of the module

Class preparation / participation

There are going to be group task for understanding use-cases, collecting ideas to use AI-based technologies to different functions and industries where you will be able to show how creatively and reasonably you can apply the principles of solving business problems with AI in specific cases.

Exam for key concepts

Understanding the most important concepts of AI is critical to being able to apply the technology in business. We are going to spend the first 4 modules on understanding these notions, show how they are implemented in different business scenarios in modules 5-8 and start the 9th module with a short exam.

Pitch competition

At the end of the course, teams are going to be given a corporate challenge: what AI tools could be used and how they could be beneficial in a specific corporate situation. Teams are going to have to elaborate key opportunities, rate them in complexity and business value and create a 5-minute presentation in highlighting the best potentials and AI related suggestions to the “board” of the company. The criteria used to judge performance include:

- Questions asked during the preparation phase from the board
- Understanding the complexity and addressing it with thorough solutions
- Business feasibility and technological validity of the ideas
- Quality of the final presentation

Creating a map of opportunities

After the end of the course, you will get a written corporate challenge to elaborate a written map of AI opportunities for the company. You will have to understand the related business processes, and look for relevant similar analogies of use-cases, or come up with internally executable development ideas. You will have two weeks to give a written proposal for a specific corporate situation with ranked opportunities.

Recommended Literature	<ul style="list-style-type: none"> • Ajay Agrawal, Joshua, Avi Goldfarb: Prediction machines: The Simple Economics of Artificial Intelligence, 2018 • McKinsey Global Institute, Artificial intelligence the next digital frontier?, 2017
Module Structure	<p>The first 4 sessions are going to give an overview about how artificial intelligence works as a technology to be able to understand the foundations of machine learning in different data sources (numeric, visual, audio, language). In modules 5-8 we are going to focus on different business processes and how AI is transforming the way we automate and augment these areas. In sessions 9-10 we turn our attention to the risks and difficulties of choosing and implementing these technologies and we finish the course with a pitch competition.</p> <p>The more detailed breakdown of the structure is as follows:</p> <ol style="list-style-type: none"> 1. Introduction to AI – history, and relationship to other technologies 2. What is “learning” – understanding machine learning through the analogies of human thinking 3. Patterns in numbers and voice 4. Natural language processing and image recognition 5. Applications in sales and marketing 6. Applications in customer service 7. Applications in manufacturing and supply chain management 8. Applications in supporting functions (HR, legal, finance) 9. The make or buy dilemma: estimating complexity and business value 10. The organizational competencies needed to integrate AI-based technologies 11. Pitch competition
Usability in other Modules/Programmes	Other Electives, Master?s Thesis
Last Approval Date	2021/09/23

Intercultural Management [MGT71592]

Module Coordinator		Moshtagh Khorasani, Manouchehr			
Programme(s)		MiM			
Term		Semester 4			
Module Duration		1 Semester			
Compulsory/Elective Module		Concentration Module			
Credits:		6			
Frequency		Annually			
Language		English			
Total Workload	150 h	Academic Teaching Hours:	44	Remaining Workload:	Self-study
		One acadmic teaching hour corresponds to 40 minutes.			
		Self-study includes lesson preparation and follow-up activities, reading assignments, assessment preparation, take-home assignments, etc.			
Prerequisites		- Taking part in leadership course before taking this seminar is beneficial to understand how culture affects leadership			
Content		1) Definition of culture and communication (cultural diversity) 2) Regulators of human life (religion, nation, class, gender, race, civilization) 3) Cultural dimensions (models of Hofstede, Trompenaars and Hampton-Turner, Hall) 4) Barriers to Intercultural Communication (anxiety, assuming similarity instead of difference, ethnocentrism, stereotypes and prejudice, nonverbal misinterpretations and language) 5) Comparative Cultural Patterns (USA, China, Middle East, Russia, etc.) Future challenges 6) Immigration and Acculturation (Europe) 7) Cultures Within Cultures: Identity and Subgroups 8) Contact Between Cultures Business Oriented			

Intended Learning Outcomes	<ul style="list-style-type: none"> • At the end of this seminar, the student will be able to reflect on the effects of culture on our perceptions. • By completing this seminar, the student will understand the mechanics of regulators of human life and tactics on inclusion and exclusion exercised by each culture. • On completion of the module, the student will understand and use different models for distinguishing between cultural dimensions. • Finishing this class, students will be able to understand different barriers to intercultural communication and understanding. • At the end of this class, students will be able to analyze different cultural patterns of some important global players and compare them to each other. • On completion of this seminar, the student will understand the role, opportunities and challenges of immigration to and acculturation in European countries. • At the end of this course, the student will be able to understand the role of subcultures within a mainstream culture. • At the end of this class, the student will be able to understand the mechanics of intercultural contact and cooperation. 															
Type of Assessment(s) and performance	<table border="1"> <thead> <tr> <th data-bbox="480 999 700 1072">Type of examination</th> <th data-bbox="700 999 933 1072">Duration or length</th> <th data-bbox="933 999 1157 1072">Performance Points</th> <th data-bbox="1157 999 1377 1072">Due date or date of exam</th> </tr> </thead> <tbody> <tr> <td data-bbox="480 1072 700 1133">Quiz</td> <td data-bbox="700 1072 933 1133">80 mins</td> <td data-bbox="933 1072 1157 1133">80</td> <td data-bbox="1157 1072 1377 1133">Exam week</td> </tr> <tr> <td data-bbox="480 1133 700 1209">Group Presentation</td> <td data-bbox="700 1133 933 1209">20 mins</td> <td data-bbox="933 1133 1157 1209">40</td> <td data-bbox="1157 1133 1377 1209">end of the course</td> </tr> </tbody> </table>				Type of examination	Duration or length	Performance Points	Due date or date of exam	Quiz	80 mins	80	Exam week	Group Presentation	20 mins	40	end of the course
Type of examination	Duration or length	Performance Points	Due date or date of exam													
Quiz	80 mins	80	Exam week													
Group Presentation	20 mins	40	end of the course													

Recommended Literature	<ul style="list-style-type: none"> - Barna, L. M. (1997). Stumbling blocks in intercultural communication. In Samovar, L. A., & Porter, R. E., (1997). Intercultural communication (eighth ed). Belmont, ca: Wadsworth Publishing. - Chaney, L.; Martin, J. (2014): Intercultural Business Communication. Boston. Pearson. - Hall, E. (1992). Understanding cultural differences. Yarmouth, Intercultural Press. - Hall, E. (1989). Beyond Culture. Anchor Books. - Harris, P.; Moran, R. (2004): Managing cultural differences leadership strategies for a new world of business. 5th edition. Woburn, MA, Butterworth-Heinemann. - Hofstede, G. (1980): Culture's Consequences: International Differences in Work-Related Values. Beverly Hills: Sage Publications. Hofstede, G. (1983): Dimensions of National Culture in Fifty Countries and Three Regions. In: Deregowski, J.B., Dziurawiec, S. and Annis, R.C. (Eds), Expiscations in Cross-Cultural Psychology, 335-355. Lisse: Swets & Zeitlinger. - Hofstede, G. (1986): Cultural Differences in Teaching and Learning. In: International Journal of Intercultural Relations, 10, 301-320. - Hofstede, G. (1991): Cultures and Organizations: Software of the Mind. London: McGraw Hill. - Hofstede, G. (1994): The Business of International Business is Culture. In: Interna tional Business Review, 3(1), 1-14. - Hofstede, G.; Hofstede, G. J.; Minkov, M. (2010): Cultures and organizations. Software of the mind ; intercultural cooperation and its importance for survival. Rev. and expanded 3. ed. New York: McGraw-Hill. - House, R.J., Hanges, P.J., Javidan, M., Dorfman, P. W., & Gupta, V. (2004). <i>Culture, Leadership, and Organizations: The GLOBE Study of 62 Societies</i>, copyright. - Jandt, Fred E. (2015). <i>An Introduction to Intercultural Communication Identities in a Global Community</i>, Eighth Edition, Sage Publications UK. - Kopper, E. (2003): Multicultural Teams. In Bergemann, N.; Sourisseaux, A. (Hrsg.): Interkulturelles Management. 3. Aufl. (S. 363–368). Berlin: Springer. - Moll, M. (2012): The Quintessence of Intercultural Business Communication. Berlin, Heidelberg: Springer. - Silverthorne, C. P. (2005): Organizational psychology in cross-cultural perspective. New York, N.Y: New York University Press. - Trompenaars, F. (1997): Riding the Waves of Culture. Understanding Cultural Diversity in Business. 2nd ed. London. Brealey. - Trompenaars, F. (2004): Managing people across cultures. Chichester. Capstone.
Module Structure	

Usability in other Modules/Programmes	- Leadership studies- Organizational science- International business
Last Approval Date	2021/09/22

M&A Strategy [FIN70933]

Module Coordinator		Brenner, Petra			
Programme(s)		MoF, MiM; MADS			
Term		Semester 4			
Module Duration		1 Semester			
Compulsory/Elective Module		Elective Module			
Credits:		6			
Frequency		Annually			
Language		English			
Total Workload	150 h	Academic Teaching Hours:	44	Remaining Workload:	Self-study
		One academic teaching hour corresponds to 40 minutes.			
		Self-study includes lesson preparation and follow-up activities, reading assignments, assessment preparation, take-home assignments, etc.			
Prerequisites		There is no prerequisite for this module.			

Content
Course description

The module covers the entire M&A journey from a corporate perspective and it is structured in four phases taught by E&Y expert practitioners and partners. The module is designed for students not necessarily specialising in finance field but for those intending to work in consultancy and strategy to gain a thorough understanding about Mergers and Acquisitions processes starting from its strategy setting, sales and separation, purchase and integration processes, and value creation and synergies in M&A. The module does not require prior knowledge in M&A, it is designed to be delivered in qualitative manner.

I. Strategy

Instructors:

1. Kerstin Lehmann, Partner, EY Parthenon
2. Dr. Petra Brenner, Partner, EY Parthenon

- Strategic considerations and rationales for corporate M&A activities (e.g. market consolidation, portfolio review, underfunded business units, for new capabilities, etc.)
- Types of corporate M&A (direct in/divestment, PE-co funding, management buy-out, etc.) and SWOT
- Starting the corporate M&A process: from idea to M&A decision
- Case studies on corporate M&A activities showing successful and failed in/divestment rationales
- Special situations: Distressed M&A and specific challenges

I. Sell & Separate

Instructor: Daniel Riegler, Partner, Ernst & Young WP GmbH

- Linking strategic decisions (see above) with the operationalization of a transaction
- Introduction of the entire divestment journey from scoping to postclosing activities
- Understanding the rationale and specifics of different exit options (incl. JV, IPO, etc.)
- Explaining sellside preparation activities and watch-outs during pre-signing and post signing phase
- Understanding the interdependency framework for corporate carveout
- Understanding interaction points and process between sell and buy-side

I. Buy & Integrate

Instructor: Dr. Georg Beckmann, Partner, EY Parthenon

- Conduct buyside due diligence from commercial, financial, tax and operational perspective
- Signto-close support and operational readiness assessment
- Develop integration guiding principles and key cornerstones
- Derive the interim operating model with the target operating model in mind

- Establish the PMI governance: PMI Org, processes and reporting routines
- Functional integration requirements
- Conduct lessons learned and set north star for value creation

I. Value Creation & Synergies in M&A

Instructor: Colja Smely, Senior Manager, EY Parthenon

- The value creation framework: A 360° view on value creation in the M&A context
- Value creation levers: identification topline and bottomline synergy assessment, cash levers and additional opportunities when merging companies
- The value creation roadmap: from analysis to achievement – how to plan a profound roadmap to understand and implement value creation measures
- Implementation and safeguarding of value creation levers and change management: how to cope with change, roadblocks and pushback to achieve the set targets
- Case studies on value creation: insights into successful and unsuccessful value creation cases

Learning outcomes:

Students will be taught using approaches, methodologies and materials from practice, learning in a similar way as junior team members in strategy or transaction consulting would do. Upon successful completion of this module, students will be able to:

- Differentiate between different corporate M&A approaches, incl. special situations, and analyze drivers for success.
- Setup a rough roadmap for sell & separate as well as buy & integrate processes, incl. determining the most important milestones and analyze interdependencies.
- Understand the concept and “why” of value creation in the context of M&A and be able to apply it to different cases
- Identify value creation levers and analyze synergies
- Differentiate between topline and bottomline value creation levers, cash levers and additional topics to review in an M&A value creation situation
- Create, understand and review a value creation roadmap and understand critical paths and unrealistic targets
- Envision challenges coming from an implementation
- Review the concepts of change management and translate learnings for value creation implementation
- Solve a comprehensive case study based on the learnings of this course including presentation to the class
- Differentiate value creation approaches by transaction context

<p>Intended Learning Outcomes</p>	<p>Competence: Upon successful completion of this module, students will be able to:</p> <ul style="list-style-type: none"> comprehend the entire process of corporate M&A, including sell and separate, buy and integrate as well as value creation and synergy assessment and implementation analyze corporate M&A activities as well as value creation activities across all stages and link theoretical approaches with real business practice <p>Knowledge: Upon successful completion of this module, students gain knowledge about the entire corporate M&A process – from strategy to value creation, i.e. they are expected to:</p> <ul style="list-style-type: none"> Identify strategic rationales for corporate M&A and underlying value drivers Explain the key activities along the divestment journey and understand the sellside process and exit options, with a specific focus on carve-outs as most complex type of divestiture Explain the key tasks and workstreams when selling and separating a business unit or subsidiary and describe the most important issues and typical pitfalls Explain the process and challenges when buying and integrating a business into an existing entity, explaining the key tasks and milestones Describe typical levers for value creation, depending on transaction context and strategic rationale <p>Skills: Students will be taught to use approaches, methodologies and materials from practice, learning in a similar way as junior team members in strategy or transaction consulting would be trained. Upon successful completion of this module, students will be able to:</p> <ul style="list-style-type: none"> Differentiate between different corporate M&A approaches, incl. special situations, and analyze drivers for success. Setup a rough roadmap for sell & separate as well as buy & integrate processes, incl. determining the most important milestones and analyze interdependencies along the deal cycle. Understand and differentiate value creation approaches by transaction context
<p>Forms of teaching, methods and support</p>	<p>Methodology: The course will be held with a theoretical and practical part that include case studies; student groups will also be given case tasks which they present to the group including joint discussion of learnings and outcomes.</p>

Type of Assessment(s) and performance	Type of examination	Duration or length	Performance Points	Due date or date of exam
	Quiz – Part 1	20 min	10 points	During the Module
	Quiz – Part 2	20 min	10 points	During the Module
	Quiz – Part 3	20 min	10 points	During the Module
	Quiz – Part 4	20 min	10 points	During the Module
	Case Study Analysis and Presentation	Presentation – 20min	80 points	By the end of the Module
Recommended Literature	to be added.			
Module Structure	Lecture, case studies, class discussions and presentations.			
Usability in other Modules/Programmes	Master Thesis.			
Last Approval Date	2021/10/08			

Practical Data Science and Artificial Intelligence in Python [MGT63439]

Module Coordinator		Strube, Moritz			
Programme(s)		MADS			
Term		Semester 4			
Module Duration		1 Semester			
Compulsory/Elective Module		Compulsory Module			
Credits:		6			
Frequency		Annually			
Language		English			
Total Workload	150 h	Academic Teaching Hours:	44	Remaining Workload:	Self-study
		One academic teaching hour corresponds to 40 minutes.			
		Self-study includes lesson preparation and follow-up activities, reading assignments, assessment preparation, take-home assignments, etc.			
Prerequisites		? Linear Algebra, probability theory, statistics? Statistical foundation of machine learning? General understanding of computer algorithms and data structures ? Basic Python skills (work through the Kaggle Python, Data Visualization and Pandas course: https://www.kaggle.com) ? Laptop with internet access, Google Chrome installed and a Google account			
Content		<p>In this course, students will apply the theoretical knowledge of Data Science and Artificial Intelligence acquired in other courses in practice by implementing programs in the computer language Python.</p> <p>In coding sessions with state-of-the-art tools, the most important topics in Data Science and Artificial Intelligence are covered. These include data sources, data import, data wrangling, data analysis, visualization, statistical modelling and model deployment.</p> <p>The course covers also topics like Cloud Computing, Mobile Computing, Edge-Computing and IoT in relation to Data Science and Artificial Intelligence.</p>			

Intended Learning Outcomes	<p>At the end of the learning process the student is able to:</p> <ul style="list-style-type: none"> list some of the most important state-of-the-art-tools for Data Science and Artificial Intelligence use these tools to analyze data and for implementing statistical models interpret the results from statistical models describe and explain the underlying methods judge the suitability of approaches and methods propose approaches for statistical analysis and statistical models assess outcomes of data science and artificial intelligence projects organize data science and artificial intelligence projects 								
Forms of teaching, methods and support	<p>Course with lectures and practical exercises. Hands-on sessions include programming tasks in Python. Students use their own laptop with Chrome installed and with their own Google account.</p>								
Type of Assessment(s) and performance	<table border="1"> <thead> <tr> <th data-bbox="480 913 699 987">Type of Assessment</th> <th data-bbox="699 913 935 987">Duration</th> <th data-bbox="935 913 1155 987">Performance Points</th> <th data-bbox="1155 913 1375 987">Due Date oder Date of Exam</th> </tr> </thead> <tbody> <tr> <td data-bbox="480 987 699 1126">Written paper with programming tasks</td> <td data-bbox="699 987 935 1126">8h</td> <td data-bbox="935 987 1155 1126">120</td> <td data-bbox="1155 987 1375 1126">During classes</td> </tr> </tbody> </table>	Type of Assessment	Duration	Performance Points	Due Date oder Date of Exam	Written paper with programming tasks	8h	120	During classes
Type of Assessment	Duration	Performance Points	Due Date oder Date of Exam						
Written paper with programming tasks	8h	120	During classes						
Recommended Literature	<ul style="list-style-type: none"> Russel/Norvig: Artificial Intelligence: A Modern Approach (4th edition) VanderPlas: Python Data Science Handbook[1] Hastie, Tibshirani, Friedman: The Elements of Statistical Learning (Introduction, Chapter 1)[2] 								
Module Structure	<ol style="list-style-type: none"> Introduction and recapitulation of Data Science and Artificial Intelligence topics Introduction to state-of-the-art tools like Python, Jupyter, Numpy, Pandas and Tensorflow Data Science and Artificial Intelligence coding sessions with online Jupyter notebooks Implementing Data Science and Artificial Intelligence with Cloud Computing, Mobile Computing, Edge-Computing 								
Usability in other Modules/Programmes	<p>Master?s thesis</p>								
Last Approval Date	<p>2021/10/06</p>								