



Aalto University  
School of Science

# MS-E2114 Investment Science

## Course practicalities

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Systems Analysis Laboratory  
Department of Mathematics and System Analysis  
Aalto University, School of Science

5 September 2022

# Why this course on investment science?

- ▶ Investments are important
  - ▶ Is the investment into Company X / Project Y a “good” one?
- ▶ A growing range of application fields
  - ▶ Banking, finance, insurance
  - ▶ Energy, environment, healthcare
  - ▶ Construction, transportation, retail, entertainment
  - ▶ “Securitization” is a pervasive trend
- ▶ There is a strong demand for skills taught in this course
  - ▶ Financial investment analysts
  - ▶ Energy market specialists
  - ▶ Procurement and supply chain managers
- ▶ This course gives a broad introduction into quantitative approaches for taking informed decisions about financial investments

# Why might you wish to study investment science?

- ▶ You may be promoted to professional positions where you are responsible for your employer's investment decisions
- ▶ You may wish to manage your own finances well
  - ▶ How should you invest your own money?
  - ▶ Which mortgage loans are best suited to your needs?
  - ▶ Should you buy a new/used car or lease a vehicle?
- ▶ Society needs people who understand investments
  - ▶ Useful general information at  
<https://www.investopedia.com/financial-term-dictionary-4769738>
- ▶ Some illustrative links
  - ▶ <https://walledculture.org/first-financialisation-now-securitisation-copyright-mus>
  - ▶ <https://www.eex.com/en/market-data/natural-gas/egsi>
  - ▶ <https://www.tradingview.com/markets/futures/quotes-agricultural/>

# Financial engineering is pervasive

## What is Fastmarkets FOEX?

Fastmarkets FOEX is an independent company providing audited, trade-mark registered PIX pulp, paper, recovered paper and wood based biomass price indices.

- ▶ FAQ
- ▶ PIX Pulp
- ▶ PIX Paper
- ▶ PIX Packaging
- ▶ PIX Recovered Paper
- ▶ PIX Bioenergy and Biomass
- ▶ PIX Methodologies, Policies & Coverage Notes

## Price Risk Management

### Interested in Hedging Product Price Risk?

Most commodity products have high price volatility. The ill-effects of that volatility can be limited through the use of price-risk management tools, offered by banks, brokers and exchanges. Metals, agricultural products and most energy products have for years had an active price risk management market. Commodity products linked to the forest products industry have recently joined this development.

In the old times, price discovery, and with it the trading, were based on a physical delivery concept. If you did not like the price on the settlement date, you delivered or received the product itself. Nowadays, more and more products in exchanges (futures, options and other such derivatives) are traded on cash settlement basis. The so-called OTC (over-the-counter) products offered by the banks are also cash-settled. For cash-settled price risk management products, reliable indices are needed. Those indices have several other uses, too.

### + Hedging in details

#### NOREXECO

The NOREXECO Exchange is a Pulp & Paper derivatives exchange that will provide a transparent, efficient, and regulated market place for pulp futures contracts allowing exchange members to optimize their price exposure.

All futures contracts are cash settled against FOEX PIX Indexes and cleared by ECC (European Commodity Clearing AG). The initial products listed will be PIX NBSK Europe and PIX BHKP Europe.

The NOREXECO Exchange will provide equal conditions for all member participants, and is supported by an increased amount of global pulp and paper participants, mainly due to the benefits of:

## Related courses at Aalto SCI

- ▶ TU-E2210 - Financial Engineering I
  - ▶ Is less theoretical and more focused on finance
  - ▶ Covers comparable topics
- ▶ MS-E2177 Seminar on Case Studies in Operations Research
  - ▶ Teams of 3-5 students solve problems proposed by clients
  - ▶ Problems provided by firms such as Aktia, Nordea, SEB, S-Pankki, Elo, OP Group, Varma, Danske Bank, Evli, ...
- ▶ Course of MS-E214400X with variable content
  - ▶ Covers timely topics in systems and operations research
  - ▶ Past courses on e.g. real options, portfolio decision analysis, quantitative risk management, equilibrium modelling
- ▶ A large number of BSc, MSc and Doctoral Theses
  - ▶ See <http://sal.aalto.fi/en/publications/theses>

# People with a background in investment science



## Janne Gustafsson

Portfolio Manager  
Ilmarinen

Janne Gustafsson, D.Sc. (Tech.), is a Portfolio Manager at the internal hedge fund division of Ilmarinen, a Finnish pension fund, where he manages a portfolio of structured credit investments and a global macro portfolio. Prior to joining Ilmarinen in early 2011, Dr. Gustafsson worked six years at Cheyne Capital Management, a London-based hedge fund. Dr. Gustafsson has also conducted research on portfolio selection and valuation of illiquid investments at Helsinki University of Technology in Finland and at the London Business School, with publications in academic journals such as Operations Research.

[Back to speakers](#)

## Event Insights



### European CLO Market Analysis (Q1 2014)

Download our European CLO Market Analysis (Q1 2014), which details recent activities in the US and European primary and secondary CLO markets

[Read more](#)



**Petri Viertio** • 1st

Chief Risk Officer at S-Pankki  
Helsinki

[View full profile](#)

[Message](#)



27 shared connections



### Petri's activity

Reshared from S-Pankki • 3mo •

Tule mukaan huipputiimiimme kehittämään operatiivisten riskien hallintaa yhä paremmaksi!



**Riskienhallintapäällikkö | Avoimet työpaikat | S-pankki**

Haemme operatiivisten riskien Riskienhallintapäällikköä vakituiseen työsuhteeseen Compliance ja operatiivisten riskien valvonta -tiimiin Helsinkiin. Työskentely S-Pankissa on ollut mielenkiintoista ja koen, että työllämme on merkitystä....

11



# ERKKA NÄSÄKKÄLÄ

Head for Group Risk at SEB

## PROFILE

Erkka Näsäkkälä is the Head for Group Risk In SEB. Before joining SEB in May 2011, Erkka has worked for Nordic Investment Bank and Depfa plc. He started his career as an quantitative Credit risk analyst. He has also experience from several Risk Management and Control positions prior the appointment to his current role in May 2017. Erkka holds a doctoral degree in Engineering Physics and Mathematics from Aalto University (Helsinki, Finland), which he received in 2005.





Paula Laine · 2nd

Chief Executive Officer at Valtion kehitysyhtiö Vake Oy  
Helsinki Area, Finland · 500+ connections · [Contact info](#)

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Valtion kehitysyhtiö Vake Oy



Teknillinen korkeakoulu -  
Tekniska högskolan

## Highlights



**40 mutual connections**

You and Paula both know Mari Hjelt, Tuomas Lahtinen, and 38 others



**You both worked at Nokia**

Paula worked at Nokia after you started

Say hello

## Tanja Eronen nimitetty Nordea Fundsin uudeksi toimitusjohtajaksi

12-10-2021 08:10

Nordean pohjoismainen rahastoyhtiö Nordea Funds Oy on nimittänyt uudeksi toimitusjohtajakseen Tanja Eronen. Hän aloittaa tehtävässä 1. marraskuuta 2021.



Tanja Eronen



Message

More...

Kimmo Lehtikainen · 1st

Head of Group Valuation Analysis and Risk at Nordea  
Finland · [500+ connections](#) · [Contact info](#)



Nordea



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Equities

Investments

Your response is anonymous and will not be directly shared with your connections or other LinkedIn members. [Learn more](#)

None of the above



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5 September 2022

11/17



**Tuomas Kervinen** · 2nd  
Risk Modelling Manager at Fortum  
Finland · [Contact info](#)

189 connections



5 mutual connections: Jussi Kangaspunta, Antti Toppila, and 3 others

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Fortum



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**Kaisa (Parkkila) Tikka** · 1st

Pricing Chapter Lead at OP Financial Group

Helsinki, Southern Finland, Finland · [Contact info](#)

[460 connections](#)



15 mutual connections: Antti Punkka, Antti Laukkanen, and 13 others

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OP Financial Group

# Overview

- ▶ Course personnel
  - ▶ Lecturer: Prof. Ahti Salo, with guest lectures by Dr. Janne Gustafsson
    - ▶ Available during reception hour at 3-4pm on Wednesdays in room Y217 (please confirm appointment by sending email beforehand)
    - ▶ <http://sal.aalto.fi/ahti>
  - ▶ Assistants: MSc Leevi Olander, BSc Jaakko Wallenius
    - ▶ Primary contact for course practicalities
  - ▶ Emails: [firstname.lastname@aalto.fi](mailto:firstname.lastname@aalto.fi)
- ▶ Lectures
  - ▶ Mondays at 10.15-12.00 in U3 (U141 Bachelor Centre)
- ▶ Exercises
  - ▶ Tuesdays at 14.15-16.00 in A2 (A215 Bachelor Centre)
- ▶ Course material
  - ▶ David G. Luenberger (1998 1st ed.; 2013 2nd ed.)  
*Investment Science*, Oxford University Press, New York.
  - ▶ Lecture slides, exercises + solutions

# Lecture schedule

1. Cash flow analysis (5.9.) [Ch. 1+2]
2. Fixed income securities (12.9.) [Ch. 3]
3. Term structure of interest rates (19.9.) [Ch. 4]
4. Applied interest rate analysis (26.9.) [Ch. 5]
5. Modern portfolio theory (3.10.) [Ch. 6]
6. Capital Asset Pricing Model (10.10.) [Ch. 7]
7. Arbitrage Pricing Theory (24.10.) [Ch. 8+9]
8. Derivative instruments (31.10.) [Ch. 10]
9. Basic options theory (7.11.) [Ch. 11+12]
10. Options pricing (discrete) (14.11.) [Ch. 12]
11. Options pricing (continuous) (21.11.) [Ch. 13]
12. Interest rate derivatives (28.11.) [Ch. 14]

# Grading

- ▶ 5 ECTS course, grading 0-5
- ▶ Exam max 30 p = 75 %
  - ▶ Only standard calculator permitted
  - ▶ 15 December 2022
  - ▶ 19 April 2022
- ▶ Assignments & Exercises max 10 p = 25 %
  - ▶ Homework problems
  - ▶ Demonstration problems in exercise sessions
  - ▶ Points valid until the end of November 2023
- ▶ Guest lecture(s)
  - ▶ One additional bonus point given
  - ▶ Name of the lecturer will be announced later



# Acknowledgements

- ▶ Slides by Ahti Salo, with modifications by Janne Gustafsson, Teemu Seeve, Antti Toppila, Jussi Kangaspunta, Pekka Mild and Ville Brummer
- ▶ Exercise materials by Leevi Olander, Teemu Seeve, Ahti Salo and Janne Gustafsson
- ▶ Essential course content in the book David G. Luenberger (1998 1st edition, 2013 2nd edition) *Investment Science* Oxford University Press, New York.