



## Course and Examination Fact Sheet: Autumn Semester 2019

### 7,325: Smart Data Analytics

ECTS credits: 4

#### Overview examination/s

(binding regulations see below)

Decentral - Group examination paper with presentation (all given the same grades) (80%)

Decentral - Active participation (20%)

#### Attached courses

Timetable -- Language -- Lecturer

[7,325,1.00 Smart Data Analytics](#) -- Englisch -- [Härdle Wolfgang Karl](#)

#### Course information

##### Course prerequisites

Good knowledge in programming on own laptop, presentation skills (with keynote from Apple), basic knowledge of Applied Multivariate Statistical Analysis.

##### Course content

The evolution from analogue to digital technologies continues to dominate the attention of decision makers today. Many tools in industrial production processes have been automated or replaced by highly complex mechanisms with pre-programmed decision-making. The change to digital modes of operations increasingly determines the lives of individuals and does so in increasingly unexpected ways.

The SDA course presents tools and concepts for unstructured data with a strong focus on applications and implementations. It presents the decision analytics in a way that is understandable for non-mathematicians and practitioners who are confronted with day to day number crunching statistical data analysis. All practical examples may be recalculated and modified: software and Quantlets are in [www.quantlet.de](http://www.quantlet.de). The SDA course endows the practitioner with ready to use practical tools for smart data analytics.

The students get insight into the area of modern internet based Computational Statistics Methods. Practically relevant knowledge on methods, data forms and Gestalt will be trained. The use of GITHUB and network techniques will be taught and transferred into [www.quantlet.de](http://www.quantlet.de). Direct computer oriented knowledge and possibilities of empirical research will be shown. We present extremely practical examples from finance, neuro economics and network analysis.

##### Course structure

Data are everywhere and the ubiquitous availability of huge amounts of data makes it necessary to develop SDA Smart Data Analytics, where "smart" stands for Specific, Measurable, Achievable, Relevant, Timely. Out of the plethora of tools that are available for many scientific disciplines this course offers an easy access to all levels of analysis without deep computer programming knowledge. SDA provides a wide variety of exercises. In addition a full set of slides is provided making it easier for the participants to reanalyze the presented material. The R and Python programming language are becoming the lingua franca of computational data analysis. They are the common smart data analysis software platforms used inside corporations and in academia. Both are OS independent free open-source programs which are popularized and improved by hundreds of volunteers all over the world.

<b>Unit 1: What do we see?</b>	<ul style="list-style-type: none"><li>• Basic concepts</li><li>• Data Management</li></ul>
--------------------------------	--



	<ul style="list-style-type: none"><li>• Structuring Data elements</li></ul>
<b>Unit 2: Data Analysis</b>	<ul style="list-style-type: none"><li>• Sentiment extraction</li><li>• Stemming, lemmatizing</li><li>• DTM Dynamic Topic Modeling</li></ul>
<b>Unit 3: Modern Data Analysis</b>	<ul style="list-style-type: none"><li>• Cluster Analysis and Classification</li><li>• TEDAS Tail Event Driven Asset Allocation</li><li>• CRIX a CRypto currency IndeX</li></ul>
<b>Unit 4: Modern Data Analytics</b>	<ul style="list-style-type: none"><li>• Rand Pythontools for text mining</li><li>• text mining in Quantitative Finance</li><li>• Applications &amp; Empirics</li></ul>
<b>Unit 5: Smart Data Analytics</b>	<ul style="list-style-type: none"><li>• NetworkCentrality, Herding effects</li><li>• Tail Event driven NetworkAutoRegression</li><li>• DYTEC DYnamic Tail Event Curves</li></ul>
<b>Unit6:Smart Data Analytics</b>	<ul style="list-style-type: none"><li>• Financial Risk Meter</li><li>• DDI Networks Topology</li><li>• Q3 D3 LSA</li></ul>
<b>Unit7: Very Smart Data Analytics</b>	<ul style="list-style-type: none"><li>• fraud and scam detection</li><li>• Options on cryptos</li><li>• Adaptive weight clustering</li></ul>
<b>Unit8: We do Smart Data Analytics</b>	<ul style="list-style-type: none"><li>• Machine learning in Economics</li><li>• Deep Learning of Forecasts</li><li>• Complexity in Banking, Scores and Networks</li></ul>

## Course literature

Franke J, Härdle WK, Hafner C (2019) Statistics of Financial Markets: an Introduction. 5th ed., Springer Verlag, Heidelberg. ISBN: 978-3-030-13751-9

Chen C YH, Härdle WK, Overbeck L (2017) Applied Quantitative Finance. 3rd extended ed., Springer Verlag, Heidelberg.

Härdle WK, Simar L (2015) Applied Multivariate Statistical Analysis. 4th ed., Springer Verlag, Heidelberg. ISBN 978-3-662-45170-0

Härdle WK, Okhrin O, Okhrin Y (2017) Basics of Computational Statistics, Springer Verlag, Heidelberg.

All examples are presented in R or Python. The Quantlets are available here: [www.quantlet.de](http://www.quantlet.de)

## Additional course information

--



## Examination information

### Examination sub part/s

#### 1. Examination sub part (1/2)

##### Examination time and form

Decentral - Group examination paper with presentation (all given the same grades) (80%)

##### Remark

--

##### Examination-aid rule

Term papers

- Term papers must be written without anyone else's help and in accordance with the known quotation standards, and they must contain a declaration of authorship.
- The documentation of sources (quotations, bibliography) has to be done throughout and consistently in accordance with the APA or MLA standards. The indications of the sources of information taken over verbatim or in paraphrase (quotations) must be integrated into the text in accordance with the precepts of the applicable quotation standard, while informative and bibliographical notes must be added as footnotes (recommendations and standards can be found, for example, in METZGER, C. (2017), Lern- und Arbeitsstrategien (12th ed., Cornelsen Schweiz).
- For any work written at the HSG, the indication of the page numbers both according to the MLA and the APA standard is never optional.
- Where there are no page numbers in sources, precise references must be provided in a different way: titles of chapters or sections, section numbers, acts, scenes, verses, etc.
- For papers in law, the legal standard is recommended (by way of example, cf. FORSTMOSER, P., OGORREK R. et SCHINDLER B. (2018, Juristisches Arbeiten: Eine Anleitung für Studierende (6. Auflage), Zürich: Schulthess, or the recommendations of the Law School).

##### Supplementary aids

--

##### Examination languages

Question language: English

Answer language: English

---

#### 2. Examination sub part (2/2)

##### Examination time and form

Decentral - Active participation (20%)

##### Remark

--

##### Examination-aid rule

Practical examination

No examination-aid rule is necessary for such examination types. The rules and regulations of the University of St. Gallen apply in a subsidiary fashion.

##### Supplementary aids

--

##### Examination languages

Question language: English

Answer language: English



## Examination content

Students work on a project that is constantly presented in class and updated/ammended. Possible projects are in the area of text mining, Crypto Currencies, Credit Scoring, SVM, Random Forests, Scagnostics

## Examination relevant literature

see above

### Please note

Please note that this fact sheet alone is binding and has priority over any other information such as StudyNet (Canvas), personal databases or faculty members' websites and information provided in their lectures, etc.

Any possible references and links within the fact sheet to information provided by third parties are merely supplementary and informative in nature and are outside the University of St.Gallen's scope of responsibility and guarantee.

Documents and materials that have been submitted no later than the end of term time (CW51) are relevant to central examinations.

Binding nature of the fact sheet:

- Information about courses and examination time (central/decentral) and examination type starting from the beginning of the bidding on 22 August 2019
- Information about examinations (examination aid regulations, examination content, examination-relevant literature) for decentral examinations after the 4th semester week on 14 October 2019
- Information about examinations (examination aid regulations, examination content, examination-relevant literature) for central examinations as from the starting date for examination registration on 4 November 2019

Please consult the fact sheet again after these deadlines have expired.