



Aachen International
Summer School
in Research Methods

RWTHAACHEN
UNIVERSITY

3RD AACHEN INTERNATIONAL SUMMER SCHOOL IN RESEARCH METHODS AND DATA SCIENCE (ACISS)

INTRODUCTION TO SOCIAL NETWORK ANALYSIS USING ADVANCED DATA MINING

UNIV.-PROF. DR. RICHARD WEBER

School of Business and Economics
RWTH Aachen University

Contact: rweber@dii.uchile.cl

SUMMER 2017

1 COURSE OVERVIEW

Course Name:	INTRODUCTION TO SOCIAL NETWORK ANALYSIS USING ADVANCED DATA MINING
Degree Programmes:	<ol style="list-style-type: none"> 1. Post-Docs and PhD students 2. Master BWL (all): MSBWL10, MSBWL13 Master Wirtschaftswissenschaften (all specializations): MSWiWi10, MSWiWi14 Master Wirt.-Ing. (MSWiBau, MSWiEET, MSWiWPT, MSWiMB, all specializations): MSWi10, MSWi15
Lecturer:	Univ.-Prof. Dr. Richard Weber
Contact:	rweber@dii.uchile.cl
Location and Time:	Kackertstraße 7, Room B037 18 September to 22 September, 9am-12pm and 2pm-5pm
Content Description:	Social networks play an ever increasing role in our society. Facebook and Twitter are just two such internet sites where users can network. Many traditional business decisions will be influenced by social network analysis (SNA). Loan granting or marketing campaigns are just two examples. But also less traditional areas, such as e.g. investigation of organized crime can benefit from this relatively new approach. This course first lays the foundation for social network analysis by introducing advanced data mining techniques. Then the main topics related to SNA will be introduced. Applications with real-world data from social networks using the respective software tools will conclude the course.
Qualification Objectives:	<p>This course seeks to enhance participants' ability to:</p> <ul style="list-style-type: none"> • understand the potential of social network analysis (SNA) in different areas, • select the adequate methods for network analysis, • analyze social networks using advanced data mining techniques, • propose decisions based on the respective network analyses.
Literature:	See readings below
Course Examination:	<p>The final grade will be composed as follows:</p> <ol style="list-style-type: none"> 1. Group work including student presentation and report (weight: 50%) and 2. Individual written exam (60 minutes) (weight: 50%).
Participation Requirements:	<ol style="list-style-type: none"> 1. Solid command of English. 2. Willingness to engage in preparatory readings of case studies and/or research papers. 3. Exchange and Erasmus students are cordially invited to apply for participation in this course.
Group Size:	30 participants (max)
Workload:	30 hours of lecturing and group work Additional individual and group preparation
Type of Teaching Event:	Lecture with integrated individual and group work on datasets
Language:	English

2 SCOPE OF THE COURSE

Social networks play an ever increasing role in our society. Facebook and Twitter are just two such internet sites where users can network. Many traditional business decisions will be influenced by social network analysis (SNA). Loan granting or marketing campaigns are just two examples. But also less traditional areas, such as e.g. investigation of organized crime can benefit from this relatively new approach. This course first lays the foundation for social network analysis by introducing advanced data mining techniques. Then the main topics related to SNA will be introduced. Applications with real-world data from social networks using the respective software tools will conclude the course.

This course seeks to enhance participants' ability to:

- (1) understand the potential of social network analysis (SNA) in different areas,
- (2) select the adequate methods for network analysis,
- (3) analyze social networks using advanced data mining techniques,
- (4) propose decisions based on the respective network analyses.

PARTICIPANTS AND REQUIREMENTS

Participants

1. Post-Docs and PhD students
2. Master BWL (all specializations): MSBWL10, MSBWL13
Master Wirtschaftswissenschaften (all specializations): MSWiWi10, MSWiWi14
Master Wirt.-Ing. (MSWiBau, MSWiEET, MSWiWPT, MSWiMB, all specializations): MSWi10, MSWi15

Due to the interactive teaching format, the number of participants is limited to 30.

Advanced master students are invited to participate, but preference will be given to PhD students. Participants should bring a personal computer/laptop to practically employ the contents learned in theory sessions. The software environment for statistical computing and graphics R (<https://www.r-project.org/>) will be used to apply the concepts acquired in class.

Requirements

- Solid command of English.
- Willingness to engage in preparatory readings of case studies and/or research papers.
- Exchange and Erasmus students are cordially invited to apply for participation in this course.

Grading

The final grade will be composed as follows:

1. Group work including student presentation and report (weight: 50%) and
2. individual written exam (60 minutes) (weight: 50%).

Complete attendance of each session of the course is obligatory. Absolutely no exceptions apply. Leaves will only be granted in cases of illnesses or if the person demanding a leave is required to participate in an official activity of the University, Faculty, or Institute. In the first case, the doctor's medical certificate must be presented to the Chair immediately (i. e. latest by the first working day following the absence day). Failure to comply with this rule leads to a no-pass grade. Passing grades can generally not be earned by students who miss more than 20% of the total class-time

3 TENTATIVE COURSE SCHEDULE

The lecturing days will comprise a morning session (9:00-12:00) and an afternoon session (14:00-17:00) that cover the indicated topics.

Day 1: Motivation and Introduction to Social Network Analysis

Preparatory Readings:

Fan, W., Gordon, M.D. (2014): The Power of Social Media Analytics. Communications of the ACM 57, No.6, 74-81

Day 2: Advanced Data Mining as a Tool for Social Network Analysis

Preparatory Readings:

Fayyad, U., Piatetsky-Shapiro, G., Smyth, P. (1996): From Data Mining to Knowledge Discovery in Databases. AI Magazine Fall 1996, 37-54

Additional Readings:

Baesens, B. (2014): Analytics in a Big Data World: The Essential Guide to Data Science and its Applications. John Wiley & Sons.

Day 3: Basic concepts of Social Network Analysis

Preparatory Reading:

Nettleton, D. F.(2013): Data mining of social networks represented as graphs. Computer Science Review 7,1-34

Day 4: Applications of Social Network Analysis

Preparatory Reading:

Bonchi, F., Castillo, C., Gionis, A., Jaimes, A.I. (2011): Social Network Analysis and Mining for Business Applications. ACM Transactions on Intelligent Systems and Technology, Vol. 2, No. 3, 22.1 – 22.36

Day 5: Integration into decision-making processes and evaluation

Preparatory Reading:

Ray M. Chang, Robert J. Kauffman, Young Ok Kwon (2014): Understanding the paradigm shift to computational social science in the presence of big data. *Decision Support Systems* 63, 67–80.

Guo Z. (2012): Optimal decision making for online referral marketing. *Decision Support Systems* 52 (2), 373–383.

Contact Details

Univ.-Prof. Dr. Richard Weber
Department of Industrial Engineering
FCFM, Universidad de Chile
Av. Beauchef 851
Santiago, Chile

Tel: +56 2 2978 4056
Email: rweber@dii.uchile.cl