Module title Social Network Analysis				
Module code Tba	**Level** Bachelor (B.Sc.)	**Hours per week** 4	**ECTS credits** 5	**Duration** ~2 weeks block course + virtual lectures

Module instructor	**Lecture type**	**Prerequisite(s)**	**Grading**
Dr. Pierpaolo Dondio, Technological University Dublin	Lectures + Guided Lab Sessions	Intermediate Programming Ability	2 assignments

Objectives

Everything is connected: people, information, the web, events and places, all the more so with the advent of online social media. A practical way of making sense of the tangle of connections is to analyze them as networks. This module provides the tools to conduct a social network analysis research, drawing on knowledge from disciplines as diverse as sociology, mathematics, computer science and physics. The module is intended to provide tools for hands-on analysis of real-world data sets, aimed to support a range of tasks: from describing key features of a network to identifying important nodes in the network, detecting communities, measuring network resilience and structural properties to explaining network formation. The focus is both theoretical (e.g., what are the key concept of social network analysis) and methodological (e.g., how do we actually carry out research on social networks).

Learning Outcomes

1. Demonstrate an understanding of the theoretical concepts underlying social network analysis
2. Choose the proper strategy for data collection in network analysis
3. Design and develop data gathering applications
4. Perform descriptive analysis of a network using dedicated softwares such as NetworkX
5. Use specific software to analyse and visualize networks, such as Gephi, NodeX or R
6. Analyse the structure of a network and perform hypotheses testing
7. Analyse advanced networks such as multi-modal and multi-level networks

Content

- Introduction and Mathematical foundation
- Basic Network Concepts
- Network Data Collection
- Measure of Centralities
- Communities detection and modularity, subgroups, clustering coefficient
- Network Models: E-R model, preferential attachment models, Small World models
- Network Resilience
- Diffusion Models
- Assortativity, Homophily and Rich Club effect
- Bi-partite networks and Ego Networks
- Hypothesis testing

Textbook/teaching material

- *Analyzing Social Networks*. Stephen P Borgatti, Martin G Everett, Jeffrey C Johnson. SAGE Publications, Jan 2018

Note: this is not the official course descriptor according to the "Studien- und Prüfungsordnung" (SPO)