

Course Description

Introduction to Web Science

The course **Introduction to Web Science** provides an overview of the field and puts the students in a position to embrace the interdisciplinary perspective on the the web, that has been fostered among others by the *Web Science Trust*[\[1\]](#).

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The Big Idea

In recent years there has grown a fascination in economic life and in society about the *connectedness* in modern life. A major stimulating factor for this development, of course, is the jump up of the dissemination of the *internet*. Despite this fascination, despite the innovations in this context, despite the economical and societal consequences of this connectedness, the phenomenon as a whole has until recently not been put in the focus of a discipline. Only in recent years the notion of **the Web** has been established to not only describe a technical basis for communication but also its interdependency with human action and its economical and societal consequences.

The term **Web** nowadays refers to the interconnection of people, services and systems (e.g.: technical, economical, social, cultural...). Web Science than deals with phenomena *in* and *of* the Web and utilizes knowledge, concepts and methods from corresponding disciplines and perspectives (informatics, economy, business administration, law, design, social sciences etc.). Web Scientists are capable of embracing a holistic, *out of the box* perspective on web phenomena and can come to viable, sound decisions.

Intended Learning Outcomes

The participants

1. know the notion of Web Science as it is established in the scientific community around the Web Science Initiative,
2. understand fundamental concepts of Web Science,
3. adopt research methods required for scientific work in the field of *Web Science*
4. understand the relevance of the different perspectives of the domain and identify the contributions of the modules of the programme to the perspectives, and
5. analyze the prerequisites of the modules, put the individual competencies in relation to these prerequisites and establish their individual initial study plan.

Structure of the Course

Starting with a brief history on Web Science we outline a comprehensive set of research questions according to [2], illustrating the complex and multifaceted nature of the Web, and the multidisciplinary nature of its study and development. These questions, disciplines and approaches together set out an agenda for Web Science, the "science of phenomena in and of the Web". Web Science is required both as a way to understand these phenomena, and as a way to use and further develop the Web as a base of sound understanding of social, economical, ecological, ethical, cultural, communicational, aesthetical and technical requirements. We survey central engineering issues, such as web architectures, the development of the Semantic Web, Web Services and so on. Beside law, design and ethical issues we consider the Web as a technology which is essentially socially embedded; therefore we review various issues and requirements for Web use and governance. Complementing study material can be found in the textbook by Brügger[3]

Engineering the Web

In this section fundamental technical and informatical principles of the Web are being surveyed. The concepts of *reference and identity*, *resources and representations*, *linked data and semantic web*, *web services*, *grid- and cloud-computing* are introduced. Study material can be found in chapter 3 of [2], and in the tutorial for linked data[4].

Analyzing the Web

In this section we will briefly review efforts to map the Web's topology, and then mathematical methods of investigation. We introduce the notion of *network*, *topology*, *metrics*. Study material is contained in chapter 4 of [2] and in chapter 1 and 2 of [5].

Social Aspects of the Web

In this section we will introduce societal and ethical aspects that are induced by the Web. We will deal with fundamental notions like *privacy*, *security*, *intellectual property*, and *global information ethics*. Study material is contained in chapter 1 of the textbook by Telow [\[6\]](#), chapter 5 of [\[2\]](#) and in the introductory parts of chapters 5, 6,, 8, and 10 of the textbook by Tavani [\[7\]](#).

Web Economy

In this section we will introduce economical notions, that came up with the Web's pervasion of economic life in the industry nations. We introduce the notions of *Computer Supported Cooperative Work*, *E-Commerce*, *Governance*. Study material is contained in a article by Graham [\[8\]](#) and chapter 6 of [\[2\]](#).

Design and The Web

Spuriously Design was often seen as a skill/action-based and practice-oriented discipline above all to make things "good looking". Therefore Designers often came into the process of product development lately. Design has a long tradition in dealing with ill defined or wicked problems and synthesizing informations across different disciplines. Donald Schön [\[9\]](#) coined the notion of Designing as a intellectual and practical activity, where successful Designers show *reflection in action* and *conversation with the material*. We enrich this approach by introducing the concept of the **Value Sensitive Design** of Friedman [\[10\]](#) and the notion of **Design Thinking** as a holistic, human-centered approach on context, process, perspectives and design qualities [\[11\]](#).

Business Administration, Management and The Web

The Web has deployed a profound influence on the organization and the management of many enterprises. Novel forms of interaction with customers and partners as well as more flexible and distributed ways of structuring and coordinating the internal work lead to ongoing transformations in the enterprises. In this part of the course a brief introduction into the purpose and recent developments in organization theory is given. Study material can be found in part I of the textbook by Hatch et al. [\[12\]](#).

Didactic Concept, Schedule and Assignments

The course concept comprises basic readings, online workshops, online discussions and an introductory and final on site presence. After a first introductory lecture on site, the subject is treated in three online workshops, that are supplemented by a wrap-up session on site. Online workshops are held on three evenings with a duration of three hours each.

Introductory lecture on site

The introductory meeting deals with organizational course details and an introductory lecture giving a small survey of the notion of [Web Science](#).

1st online session

The set texts for this session are the basic readings of the chapters: *engineering the web* and *analyzing the web*.

This session held in a plenary discussion on central issues. On the basis of two case studies concepts of Web Science will be identified and the relationship to the respective remarks in the literature will be established.

2nd online session

The second session deals with *Social Aspects of the Web* and *Design and the Web*. First part of this session is a plenary discussion based on the concepts and approaches found in the corresponding basic readings. Special emphasis will be given to establish a discussion about the Web on a *conceptual level*. Quality criteria for concepts for Web projects will be discussed and established and the challenges of *adequate research for Web projects* will be discussed.

3rd online workshop

On the basis of a case study, exemplifying the societal impact of the Web, the different perspectives of Web Science, as layed out in the paper by Berner-Lee^[2], will be discussed

Offline-Activity of the Students

According to the intended learning outcomes all participants put their individual subject-specific competencies into relation to the prerequisites of the modules (chapters as shown above) and identify their potential knowledge deficits. They develop their individual study plan to abolish these deficits and pass it to the lecturer one week before the final session on site.

Wrap-up session on site

This on site workshop is dedicated to clarify open questions of the student and to summarize workshop content.

Examination

This information is provided on the current semester's page.

References

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