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Research Profile

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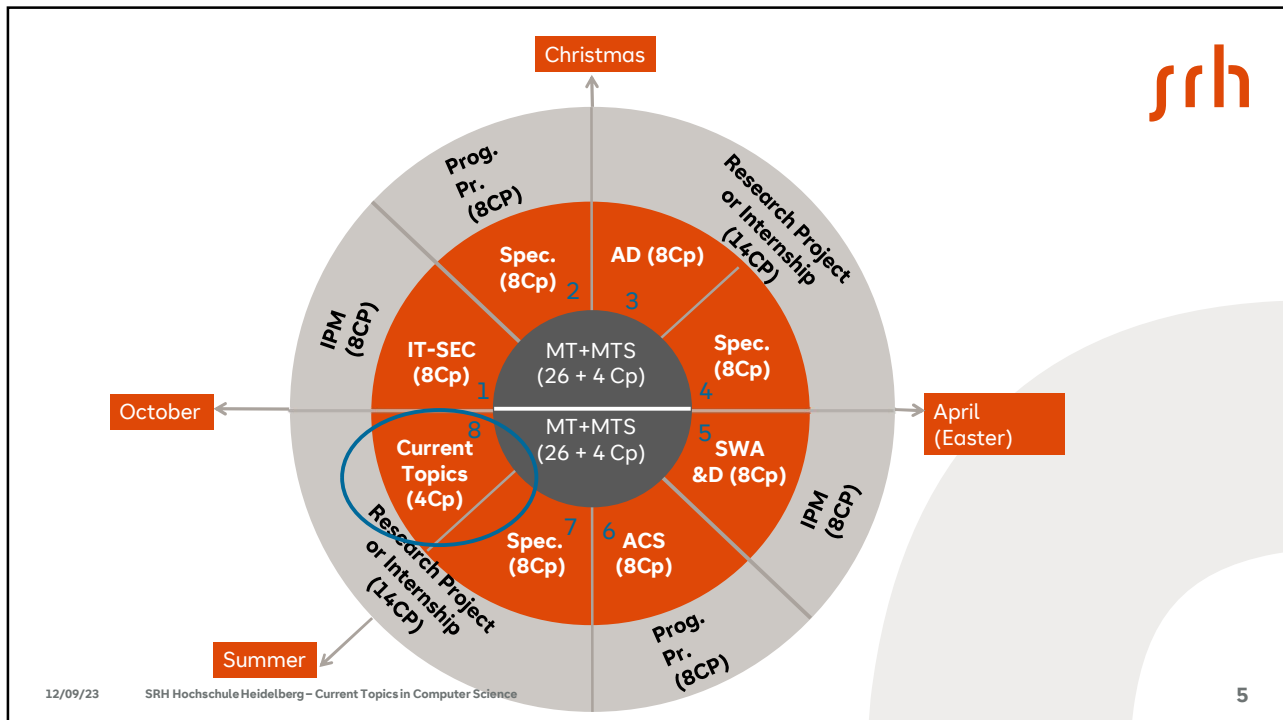


Scientific Competencies in the ACS Master Program

- **All lectures follow rules of scientific work**
e.g. analysis and comparison, literature and citation etc.
- **State of the art** in a specific research topic
- Current Topics in Computer Science
 - Applied Research (small project)
 - Research Project (large project) / Internship
 - Master Thesis

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Description and Goals

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Description and Goals



This module addresses **selected topics in Computer Science**. The students will **deepen their knowledge** on a particular current topic in computer science. Furthermore, the students will strengthen their **research skills, their presentation skills and their ability to actively participate in a scientific discussion**.

Students will research a particular aspect of a given **topic based on scientific literature, present** it to an academic audience and **discuss the topic** in a moderated discussion with other students. They will also **write a short report** on the scientific paper including a graphical representation of a scientific aspect from the paper.

Competencies



03

Methods and Specialisation



The students will be able to

- **Research a current topic** in the area of computer science independently within a given time.
- Understand the difference between **scientific literature** and **literature from popular science**.
- Do **literature research** by your own, **analyze, summarize, evaluate, present and discuss** the topic with a qualified audience.

Social and Self Competencies



- After finishing this lecture, the students will be able **to search and find research papers in a new area**.
- They will be able to **determine the quality** of this article.
- The students will strengthen their **presentation skills** and learn to present a new topic to an academic audience.
- The students will strengthen their ability to actively participate and follow a **scientific discussion**.

What is Scientific Research?

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What is Scientific Research?

Definition 1: John W. Creswell defines research as *“Research is a process of steps used to **collect and analyze** information to **increase** our understanding of a **topic or issue**, it poses of 3 steps; **pose a question** → **collect the data to answer the question** → **present an answer to the question**”*

Definition 2: OECD defines research as *“Any **creative** systematic activity undertaken in order to **increase** the stock of knowledge, including knowledge of man, culture and society, and use of this knowledge to device **new applications**”*

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What is scientific research?



Definition 3: Webster Dictionary defines research as *"Studies **inquiry** or **examination**; especially: investigation or experimentation aimed at the **discovery** and interpretation of facts, revision of accepted theories or laws in the light of new facts, or practical application of such new or revised theories or laws"*.

Why publish articles?



Improving your **professional opportunities**



Influencing people



Financial rewards



Personal **rewards**

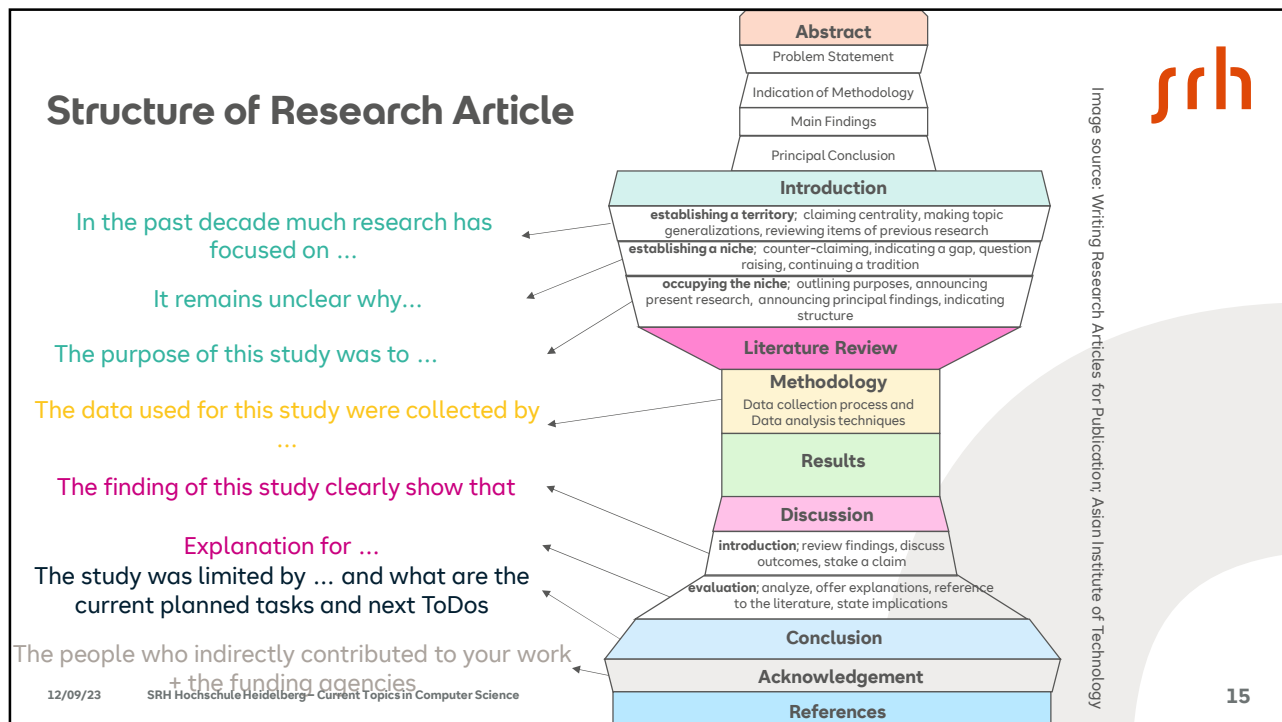


Discussion & **Insights**



Contribute to the literature





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How do I estimate the quality of a research article?

Science Citation Index (SCI), Scientific Citation Index Expanded (SCIE), Impact Factors (IF), etc.

- The **SCI is the first systematic analysis of article citations** and the **basis of a ranking scheme** (E. Garfield, 1955). Many other ranking indices were developed later in order to generate a **system for quality assurance in science**.
- Garfield E. Citation indexes for science; a new dimension in documentation through association of ideas. Science 1955;122:108-11.
- SCIE: <http://mjl.clarivate.com/cgi-bin/jrnlst/jloptions.cgi?PC=D>
- Kumar A. Is "Impact" the "Factor" that matters...? (Part I). J Indian Soc Periodontol 2018;22:95-6 – short paper on citation and the impact factor.

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How do I estimate the quality of a research article (cont.)?



- **Ranking:** SCI / SCIE / IF or similar
- **Source of publication:** Journal, internet / institution / conference, book, ...
- **Type of article:** Scientific paper, conference p., review p., historical p., encyclopedia
- **Authors:** Who are the authors?, Where are the authors working? Institution?, What have the authors published recently? How many papers?
- **Year** of publication
- **Related articles?** Are there related articles? Positive or negative?

Task

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Task



According to the competencies, „Current Topics in Computer Science“ will have several „tasks“:

- Literature based **research on scientific topics** or **collection** of a given article
– **not older than 5 years.**
- Estimation of the **quality** of the selected article / paper / publication.
- Brief **written report and oral presentation** of the selected article.
- **Presentation and discussion** of the reported articles in a „**Conference Style Presentation**“ (Paper quality analysis, introduction and state of the art, paper review, reflection);
Participation is mandatory for everyone in the group.
- **Organisation: The topic area (group) will have max. 6 participants.**

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Scientific topic A1: Intelligent User Interfaces for People with Low Vision, Elderly, and Children



Keywords: Machine Learning, user interfaces, visually impaired people, older adults, children.

Recent, relevant papers will be given by Prof. Dr. Chandna in moodle – please choose the respective paper and coordinate your selection with your team and team representative - register your paper by September 13th, 23:59 hrs in Moodle.

Supervisors: SC

Exam: 26.09.2023

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Scientific topic A2: User Interface Design, User Experience, and Usability



Keywords: Audio user interface, video user interface, design thinking, user-centered process

Recent, relevant papers will be given by Prof. Dr. Chandna in moodle – please choose the respective paper and coordinate your selection with your team and team representative - register your paper by September 13th, 23:59 hrs in Moodle.

Supervisors: SC

Exam: 26.09.2023

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Scientific topic A3: Large Language Models Transform Science, Society, and AI



Keywords: NLP Natural Language Processing, BERT, GPT, Education, Science....

Recent, relevant papers will be given by Prof. Dr. Chandna in moodle – please choose the respective paper and coordinate your selection with your team and team representative - register your paper by September 13th, 23:59 hrs in Moodle.

Supervisors: SC

Exam: 26.09.2023

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Scientific topic B1: Health Care App Development



Keywords: Health apps for consumers/patients, fitness apps, nutrition apps, recent (health) app development, artificial intelligence, apps and sensors/smart devices, chip measuring,

Recent, relevant and high quality scientific papers (7-15 pages, not older than 5 years) have to be identified - register your paper by September 13th, 23:59 hrs in Moodle.

Supervisors: GM

Exam: September 28th.

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Scientific topic B2: Audio Interface Design / Functionalities / Technologies



Keywords: Audio vs graphical user interface, combination and interaction of audio and graphical ui's, audio user experience, design and development, NLP, chatbot systems, specifid Large language Models (LLMs), applied artificial intelligence...

Recent, relevant and high quality scientific papers (7-15 pages, not older than 5 years) have to be identified - register your paper by September 13th, 23:59 hrs in Moodle.

Supervisors: GM

Exam: September 28th.

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Scientific topic B3: Gamification and e-Learning in Moodle



Keywords: Moodle e-Learning systems development and gamification, MOODLE extensions /add ons overview, gamification and applied artificial intelligence, single- and multi-player mode, Moodle extensions development, best practices,...

Recent, relevant and high quality scientific papers (7-15 pages, not older than 5 years) have to be identified - register your paper by September 13th, 23:59 hrs in Moodle.

Supervisors: GM

Exam: September 28th

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Scientific topic C1: Data quality assessment



Keywords: Health dimensions, ML and AI perspectives, software platforms (performance, comparison)...

A sample of recent, relevant papers will be given by Prof. Dr. Theodoros Soldatos in Moodle – please choose the respective paper and coordinate your selection with your team and team representative - register your paper by September 13th, 23:59 hrs in Moodle.

Supervisors: IS

Exam: September 29th

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Scientific topic C2: Using NLP to understand text



Keywords: text summarization, biomedical content, mental health, relationship extraction, reproducibility....

A sample of recent, relevant papers will be provided by Prof. Dr. Theodoros Soldatos in Moodle. Please, choose among those (or propose other) that reflect your own interest and coordinate the selection with your team and team representative - register your paper by September 13th, 23:59 hrs in Moodle.

Supervisors: IS

Exam: September 29th

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Scientific topic C3: Chatbots in the LLM era



Keywords: Assessment of performance, personalized (e.g., mental, etc.) support, decision making...

A sample of recent, relevant papers will be provided by Prof. Dr. Theodoros Soldatos in Moodle. Please, choose among those (or propose other) that reflect your own interest and coordinate the selection with your team and team representative - register your paper by September 13th, 23:59 hrs in Moodle.

Supervisors: IS

Exam: September 29th

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Lectures



Time	Content	Lecturer
1 st Week of module	Introduction and topic registration, literature research methodologies, scientific citations, library and internet, info graphics, Paper selection, upload and approval	Prof. Chandna, Prof. Moeckel, Prof. Soldatos
2 nd Week of module	Status presentation, introduction presentations & slides, text analysis of concrete article, info-graphic, repetition and Q&A, consultation on request, submission of one page report plus info-graphics in Moodle	Prof. Chandna, Prof. Moeckel, Prof. Soldatos
3 rd Week of module and later	Exam conference style: Presentation & Discussion, all students of one group have to participate!	Prof. Chandna, Prof. Moeckel, Prof. Soldatos

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Time Planning (B-Teams)



11.09.23	Introduction and tasks	all teams	Arc205/206
12.09.23	Literature search	B-teams	T53, short
13.09.23	Paper registration	all teams	Moodle
14.09.23	Lecture/Practice: Paper selection	B-teams	T53
18.09.23	Lecture/Practice: One-pager	B-teams	T53
19.09.23	Lecture/Practice: Infographics	B-teams	T53
21.09.23	Lecture/Practice: Status pres.	B-teams	T53, 2min+q&a
25.09.23	Lecture/Practice: Presentations	B-teams	T53, short
26.09.23	Lecture/Practice: Q&A, feedback	B-teams	T53
28.09.23	Exam: Conference Presentation	B-teams	T53

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Task



Selection of topic and team:

- Log into Moodle, select CTCS (harmonisiert), select the tab: **Selection and Registration**
- **Start September 12th, 5pm CET til 11:55pm CET - updated**

Selection of paper within your topic

- Prof. Chandna and Prof. Soldatos will provide sample papers – make a selection together with your team – see deadline on topic slide

Search for relevant papers

- Prof. Moeckel will not provide papers but will explain on Tuesday the topics, and how you can find relevant scientific papers – see deadline on topic slide

Task (continued)



Registration of Your CTCS paper

- Deadline: Wednesday, 13th of Sept., 23:55CET in
- Moodle: Go to the CTCS module | **Selection and Registration | Paper Registration**
Enter your name, group/topic number (A1, A2...) and your paper. Be sure, that there is no duplicated paper.

Status Presentation Paper Content – Elevator Pitch (not marked):



- In a 2 minutes presentation, you have to give an initial analysis of your paper
- Please prepare information on:
 - What is the problem setting?
 - What is the research question?
 - What is the contribution of the paper?
- The answers have to be presented to your group you are assigned for.
- The presentations will be organized as “Elevator Pitch”, you have 2 minutes time.
- Please bring your printed handouts.

Status Presentation Info-Graphics – Elevator Pitch (not marked)



Continued:

- Please present the visual interpretation of the contribution of the paper (see examples).
- This visual interpretation has to be designed by you as the presenter.
- Bring in a A3 printout with this visual interpretation (info-graphics).

Presentation – Conference Style (Exam Part1, 50%)



- The results of your paper analysis have to be presented to your group you are assigned for. The presentations will be organized in a “Conference Style”.
- The presentation will be **15 minutes plus 5 minutes** for questions.
- The attendance in the whole conference of your group is mandatory.

Written Report (Exam Part2, 50%)



- One page only!, please use 2 columns, IEEE format.
- **Title** “Current Topics in Computer Science Seminar” and title of the analyzed research paper (including author(s) and year of publication),
- **Paper quality analysis** [5%]: The search strategy i.e. the keywords as well as resulting list of articles, the quality of the paper (ranking, citations, author, institution).
- **Your name**, date of presentation / submission.

Written Report (Exam Part2, 50%) continued:

- **Introduction** [20%]: Brief intro to the research area, the "Big Picture".
- Challenges and Contributions
- **Methods, approach, architecture, framework** [50%]
- **Results and discussion** [20%]
- **Reference** list – include also the main papers!!! [5%].
- Use the back side / second page for your **info-graphics / poster**.

Hints

- MOODLE: <https://moodle.hochschule-heidelberg.de>
- Login with standard userID and password
- Lecture: Current Topics in Computer Science
- **MANDATORY: Upload of selected paper**
- **MANDATORY: Submit your one page documentation into MOODLE**
- **MANDATORY: Presentation and discussion in the corresponding group (Conference Style)**
- **See also „0-CTCS-Structure“ and task description in MOODLE**



**Thank you for your
attention!**

Prof. Chandna
Prof. Moeckel
Prof. Soldatos