

320371/CSGRP

How to become a (guided) Researcher in CS

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Regulations and Formalities

How to become a (guided) Researcher in CS

GR Topics of the CS Groups

0.1 Regulations and Formalities

Guided research is part of the undergraduate program in CS. The guided research courses are offered by all professors of Computer Science jointly.

The professors propose a number of research projects, which will be posted on a dedicated guided research website.

Students interested in particular projects should get in touch with the professor in charge of that project.

Formalities

- ▶ There is **no graduation without guided research!**

- ▶ Details at <http://cnds.eecs.jacobs-university.de/courses/gr-2014/>

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- ▶ Course: 320371 **Guided Research Proposal Computer Science** (2.5 ECTS)
 - ▶ choose an advisor (might effectively be postdoc/grad.) (until October 1. 2013)
 - ▶ register your advisor by an e-mail to j.schoenwaelder@jacobs-university.de
 - ▶ jointly define/choose a topic (in October)
 - ▶ write a “guided research proposal” document, which (target size 10–15 pp.)
 - ▶ introduces the field of study,
 - ▶ states the research questions/hypotheses,
 - ▶ surveys the expected results and sets up a work plan with timetable.
 - ▶ Submit to <https://jgrader.de> until Dec. 5. 2013! (or lose 10% per day late)

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- ▶ Course: 320342 **Guided Research in Computer Science + Thesis** (7.5 ECTS)
 - ▶ work off the proposal ⚠ could come out differently ⚠ (it's research after all)
 - ▶ write a wonderful thesis with the results/implementation (target size 30–50 pp.)
 - ▶ Submit to <https://jgrader.de> until May 11. 2014! (or lose 10% per day late)
 - ▶ guided research presentation on May 15/6 2014 (15+5min)
 - ▶ grading: 80% report + 20% presentation
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 - ▶ (Optional:) make a publication from your work! (looks good on your CV)
 - ▶ Details at <http://cnds.eecs.jacobs-university.de/courses/gr-2014/>



what matters is the content
not the layout or the length!



we have a \LaTeX template you can use at
<http://cnds.eecs.jacobs-university.de/courses/gr-2014/>

QUESTIONS?

0.2 How to become a (guided) Researcher in CS

What is CS Research

- ▶ CS is at the intersection between Mathematics, Science, & Engineering
- ▶ **CS Research is what CS Researchers are interested in, at Jacobs:**
 - ▶ Graphics & Visualization (nice pictures & communicating data Profs. Linsen, Hahn)
 - ▶ Robotics (e.g. autonomous vehicles: Prof. Birk)
 - ▶ AI & Cognition (how the (human) minds work: Profs. Jaeger, Birk, Kohlhasse)
 - ▶ Networks & Distr. Computing (Internet, multiple computers: Prof. Schönwälder)
 - ▶ Machine Learning (statistical modeling: Prof. Jaeger)
 - ▶ Computer Vision (Robot Vision, SLAM: Prof. Birk)
 - ▶ Databases & Geo Information (mass storage, access via the Web: Prof. Baumann)
 - ▶ Semantic Web & Publishing (Retrieval & Active Docs: Profs. Baumann, Kohlhasse)
 - ▶ Automation of business processes (corporate IT: Dr. Mahleko)
 - ▶ Language, Logic & Knowledge (Knowledge Representation: Prof. Kohlhasse)
- ▶ **Meet them and find out!**

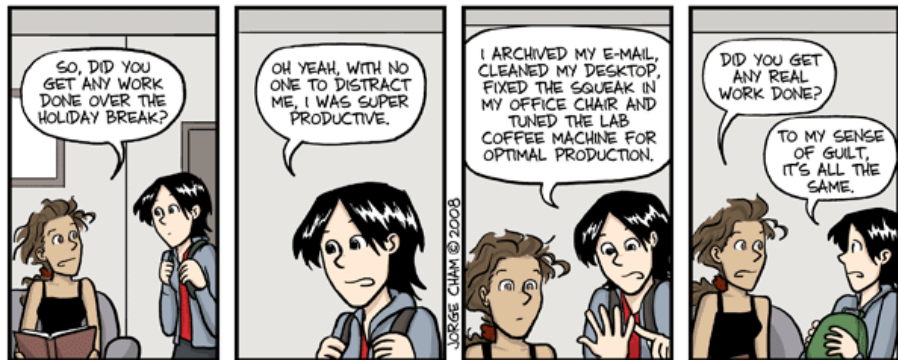
Dos and Don'ts for Guided Research (after [BdBHP85])

- ▶ Choosing a topic:
 - ▶ choose a topic you (are/can be) enthusiastic about (research should be fun!)
 - ▶ your supervisor should also be (so you get the attention you deserve)
 - ▶ do not seek to “solve the world” (must be doable in 3 months)

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- ▶ Once you have a topic:
 - ▶ **Read the literature.** Have projects similar to yours been tackled before, and were previous attempts successful or unsuccessful? What existing techniques can you borrow or adapt to your project? Do you need to adapt your project proposal to make it novel or feasible?
 - ▶ **Talk to people.** Do not go away and hide. Do not be ashamed of your ideas. Other people's are sillier.
 - ▶ **Tackle a simplified version** of your problem. Ask your supervisor for exercises, mini-projects, etc.
 - ▶ **Write down your ideas in a working paper.** Imagine yourself explaining your ideas to someone. You will be amazed at how half-baked ideas take shape and errors are exposed or solved.
 - ▶ **Give a talk to a small group.** This has a similar effect to writing down your ideas.

Procrastination (avoid it if possible)



WWW.PHDCOMICS.COM

► if unavoidable, use it productively!

(google for recipes)

Your Thesis should have a Message (after [BdBHP85])

- ▶ Your thesis is usually relevant and well-told, iff it has a “message”.
- ▶ **Example 2.1 (The Computational Modeling of Religious Concepts)**
(Fr. Aloysius Hacker)
 1. We apply ideas from Informatics to the understanding of religious concepts.
 2. Previous attempts to explain religious concepts, e.g. the holy trinity and miracles, have often encountered philosophical problems.
 3. These problems arose because the appropriate terminology was not available. Computational terminology often provides an appropriate analogy.
 4. Although some problems still remain, e.g. free will,
 5. We are seeing the beginning of a new, computational theology.
- ▶ Each of these five points will usually make one or two sections in your thesis

0.3 GR Topics of the CS Groups

KWARC (Workgroup Kohlhase) focuses on GOFAI

- ▶ KWARC $\hat{=}$ Knowledge Representation, Natural Language, & Reasoning
- ▶ KWARC is interested in the the structure of knowledge in brains. (modeling)
- ▶ KWARC tries to represent structured knowledge. (math docs as test tube)
- ▶ KWARC validates cognitive theories by building cool semantic gadgets for Math
- ▶ Topics for Logicians: Category Theory and Meta-logical Frameworks:
 - ▶ Representing logic and logic transformations (extending meta-logics)
 - ▶ Building and maintaining graphs of mathematical theories (foundations of math)
- ▶ Topics Natural Language Processing:
 - ▶ Semantics recovery from the arXiv for search and interaction
 - ▶ Finding linguistic markers for theories and theory morphisms
- ▶ Topics for Web Developers: Semantic Publishing:
 - ▶ Building a math web search engine
 - ▶ Interactive math documents as an interface to semantics
 - ▶ Build the next-generation ...
 - ▶ ... Scientific Publishing/Refereeing Infrastructure
 - ▶ ... eLearning Applications and Help Systems
 - ▶ ... Software Engineering and Change Management Systems.

References



Alan Bundy, Ben du Boulay, Jim Howe, and Gordon Plotkin.

The researcher's bible.

<http://homepages.inf.ed.ac.uk/bundy/how-tos/resbible.html>,
1985.