

ERFAHRUNGSBERICHT

Herkunftsland:	Slowakei
Studienort:	TU München
Studienfach:	Computational Mechanics
Projekt	Master
Förderzeitraum	2012-2014

I. Practical experiences and advice:

My decision to apply to Master's programme Computational Mechanics (COME) at Technical University Munich (TUM) matured towards the end of year 2011. The application period was opened till May 2013 and I was informed about my successful admission in July 2013. The application process was described in detail on the course webpage (in English/German): <http://www.come.tum.de/> and I found it easy to follow.

Regarding the legal authentication of translated official documents (which have to be attached to the application), I found very useful the possibility to have the documents authenticated at German embassy in Bratislava, Slovakia. This service was provided free of charge on documenting my intention to study in Germany with the print-out of preliminary online application.

The official start of academic year was set to be the 10. October 2012. I arrived to Munich on 1.10.2012 in order to take part in introductory course for computer programming, as well as German language course (both provided by the TUM). In the meantime, I had time to take care of the practicalities required for starting a life in Munich (university webpage provides a "to-do" list with links and further explanations). The office for international students at TUM is helpful in case of questions, or need for assistance.

Probably the most demanding task for a new-comer to Munich is to find an accommodation within student's budget. The market of affordable housing is highly undersized. Although I recommend to apply for the student dormitory (Studentenwohneheim, prices 300 – 400 €/room(studio)/month) as soon as having received the letter of admission to the university, I would not count on that as the only alternative. As the capacities are limited and waiting times stretch from 1 – 5 semesters, it is unfortunately not guaranteed to get a room and more than probable not to get it for the beginning of the term when it is needed the most. Despite of that, it is a good back-up and the availability of a room in dormitory might arrive just in a moment, when it's needed (in my case 2 months after semester had started). As a consequence, for most of the students the best option is to rent a room in a shared flat (Wohngemeinschaft – WG, prices 300 – 500 €/room/month), but count in several weeks of intense searching and going for flat mate interviews. For the intermediate period, the lodging possibilities are youth hostels, renting a room via airbnb.com, or using a couchsurfing.org

portal (if one is a member). Above mentioned webpage of COME programme offers also other tips and tricks to sort out the accommodation issues.

Looking for accommodation online (from abroad) or via intermediary did not prove as feasible. Furthermore, one should be careful and never sign any contract, nor provide any deposits online – without personal contact and interview with the other side. Therefore, I would recommend arriving to Munich before the semester starts and spend the time by searching for accommodation. Active search over internet and social media networks is probably the inevitable part of “starting in Munich”, whereby writing at least a part of the application in German and having a German telephone number is a big advantage, if not the must. As for myself, it took me a month of everyday search (approx. 2hours/day) to find a room in a shared flat.

Getting to Munich from my country (Slovakia) takes only 6 hours and one can choose to travel by car, bus, train or by plane. In the last two years, I have tried and used all, except the last mentioned. In terms of convenience, flexibility and price/value ratio, I think long-distance bus or combination of bus with train offered often at special rates by private companies is the best option (see flixbus.de, meinfernbus.de). Shared car transportation (mitfahrgelegenheit.de) would be the second option, though less reliable in terms of time and convenience. For students under the age of 25 years a discount card of German (BahnCard) or Austrian (VorteilsCard) could be an interesting option.

For transportation within the city of Munich there is a “Semester ticket” available for TUM students. It was first introduced in winter semester 2013. The very basic validity, which is automatically included in the semester matriculation fee (at no extra cost), enables a limited usage of all means of public transport in Munich suburban area, namely working days after 6pm and weekends/holidays. For a fixed surcharge (approx. 140€/semester), the validity extends to 24hours/7days a week. I have been using the extended validity for the last two semesters and can only recommend it. It allows for high flexibility and you don’t have to care about tickets for the entire semester anymore. Also for students, who will attend lectures in Garching (new TUM campus in the northern part of Munich), having a semester ticket makes the cheapest option how to commute back and forth (30 minutes from city center by Underground). Getting a bike highly pays off (not only for commuting, but also recreational purposes), since Munich has one of the best developed bike lanes networks. Second-hand bike can be bought online, or on weekly flea markets for a reasonable price (under 100€).

Munich offers a lot of possibilities for socializing, sport and free time activities (see University Sport Center – ZHS Zentrale Hochschulsport München: <http://www.zhs-muenchen.de/>). Moreover, BAYHOST organized each year one weekend event outside of Munich for BAYHOST scholarship holders, which was a good opportunity to get into touch and socialize with other fellow students.

For those, who would like to improve their German or study any other foreign language, TUM Language Center provides courses in more than 40 languages on semester basis (free of charge, ECTS credits could be accounted to study curriculum). I took a part in a German course myself at the beginning, though I mainly practiced and improved my language skills via interaction with my German flat-mates.

As for the living costs, BAYHOST financial support enabled me to study in Germany. With the amount received on monthly basis (700 €), it is possible to cover basic student living expenses (room, transport, food). It is worth to note however, that a part time job is necessary/advisable to cover additional living expenses (free time - eg sports, travel, PC equipment for studies, phone credit, cloths etc.). Great option provides the German legislation with so called "minijob" contracts, which enables you to earn up to 450€/month additionally without being taxed (be aware that current BAYHOST conditions limit this sum to 401€/month).

II. Academic experiences and further qualifications:

Computational Mechanics (COME) at TUM was founded in 2000 by the Civil Engineering faculty to meet today's increased demands for experts in the field of engineering. Generally, the lectures are offered by Civil Engineering faculty at the TUM main campus in downtown Munich. However, it is also possible to take lectures on computational mechanics from other faculties either at the main campus or in the Garching campus. The 2 years Master's programme is offered in English and each student has to complete in total 120 credits: 90 coming from the courses and 30 from the master's thesis. The 90 credits achieved through course work are divided into 3 parts: 36 credits of compulsory courses, 24 credits of compulsory elective courses and 30 credits of elective courses.

Computational mechanics brings together highly sophisticated methods of theoretical, applied and structural mechanics, as well as computer science, software engineering and applied mathematics. The choice of compulsory elective courses will be determined (to a limited extent) by personal fields of interest of each student. These three main fields of interest could be in my view identified as: Hydraulics/Hydrodynamics (Computational Fluid Dynamics), Structural Problems (Nonlinear Finite Element Methods, Theory of Plates and Shells, Computational Material Modeling, Structural Dynamics) and Applied Mathematics and Programming (Structural Optimization, Parallel Computing, Functional Analysis and Computational Linear Algebra). Of course, the selection is individual and each student can combine from the listed subjects above (whereas some subjects are prerequisite for studying the others). Many additional subjects can be chosen to build up on and further deepen the gained knowledge.

As part of the "Bavarian Graduate School of Computational Engineering" (BGCE), the come.tum program offers an honors program funded by the Elite Network of Bavaria. The Bavarian Graduate School offers additional courses to its most capable and dedicated students. The cornerstones of the programme are: extensive project work, summer/winter academies and seminars on "soft skills". Finally, I decided not to take part in the programme due to time reasons, since at the time of admission (second semester of studies), I was already involved in part time work in the field of my interest at one of the chairs of the COME programme.

Students are encouraged to get involved into extra-curricular activities (such as conferences), or to get employed as student research assistants (Wissenschaftliche Hilfskraft). Because of my interest in programming, I accepted an offer from Chair of Computation in Engineering already in first semester of my studies. As a part of my work task, I participated on development of high-order finite element

multi-physics research framework. For me, this was a highly valuable experience with goal-oriented team work, slightly different than typical student class projects. By learning by doing, I improved my practical programming knowledge, as well as communication/collaboration skills.

Thanks to the support of the same chair, I also participated at IEEE Germany Student Conference 2014 in Passau with a scientific paper: Computational modeling of Stereolithography. The core work for the findings described in the paper was done in the frame of Software Lab – part of the COME curriculum, which is a compulsory 2-semester project work in teams dedicated to solving/researching a particular scientific topic (here supervised by the same chair). Submitted scientific paper was awarded with the prize for the best paper of the conference.

The other extra-curricular activity worth to mention is the annual Summer school (Ferienakademie, <http://www.ferienakademie.de/>) that lasts two weeks and takes place in non-formal environment of Alps. Students from TUM, FAU Erlangen and University of Stuttgart are welcomed to apply to one of the offered (each year approx. 10 different topics) technical and scientific workshops that are guided by the experts in respective fields from the whole Germany. I was pleased to find out, that I was accepted to participate in a course “High-Order Simulation of Waves and Fluids” in September 2014.

Currently, I am working on my Master thesis, which I am writing at the Chair of Structural Analysis. The topic of the work is investigation and implementation of new coupling algorithms for the Fluid-Structure Interaction. The Chair of Structural Analysis at TUM is one of the few chairs from Civil Engineering faculties in Germany that runs extensive research in this highly attractive field of computational engineering. I was provided with workstation and working place in the computer room of the chair, as well as the possibility to run computationally-demanding simulations on a chair computer cluster. I appreciate the friendly, motivating atmosphere and a constant support from the chair's staff. The Master thesis is expected to be finished and defended till the end of this year (2014).

All in all, students at TUM have a number of studying possibilities and resources to fully devote themselves to academic research in a direction of their interest. The library (which also provides loan/delivery service German-wide) is located at the main campus in city center. Apart from books and journals, students with the TUM credentials (<https://eaccess.ub.tum.de>) can use the extensive search databases and electronic materials from major publishing houses online. The whole study administration is run via online academic system and educational process itself is supported with the online learning portal Moodle (<https://www.moodle.tum.de/>). This was used heavily to provide study materials, hand in assignments and communicate between lecturers and students.

III. Plans and activities after the BAYHOST-funding

The experience of a top quality academic environment at TUM encourages me to pursue academic career, which is my aspiration in a long run. Nevertheless, my personal preference for the close is to get employed at a challenging and interesting job position in Germany, where I can use knowledge acquired during my Master studies at TUM. I am sure, that choosing a university in Bavaria was a right move and it has opened wide spectrum of future opportunities for me. I enjoyed the multi-



cultural environment of the international Master's programme, as well as hospitality of BAYHOST community.

Munich, 12. September 2014