Universal Computing and Business

A Unique Master's Program
at the Johannes Kepler University (JKU)
in Linz, Austria, Europe

Short Info for Students
January 2017

Goal and Content of the Program

Universal Computing covers the breadth and depth of computing: From the deep foundation of computing in logic and mathematics to the numerous exciting and permanently evolving new applications in all areas of science, technology, industry, and society.

The **Johannes Kepler University**, a young (1967) campus-based university in the center of Europe, is the place where such an ambitious view can be implemented thoroughly: Over a hundred professors of mathematics, informatics and related areas excel in a wide range of research and teaching.

The program is organized by **RISC (Research Institute for Symbolic Computation)**, an institute of the JKU with high international research reputation and a long tradition and experience in organizing both international study programs as well as cooperation programs with the industry. The founding chairman of RISC, **Professor Bruno Buchberger**, is also the mastermind and head of the "Universal Computing and Business" master's program.

The international **"Universal Computing and Business" master's program** is

organized in a **flexible** way such that international students with a bachelor in mathematics or informatics (or related areas like information technology, business informatics, mechatronics etc.) can enter the program and obtain a **Master of Science Degree** according to the EU-norm.

The study and working language in this program is **English**.

Typically, we compose **an individual study plan for each student** depending on the past course work and the interests and future career goals of the applicant.

We motivate all students, in addition to pursuing their specialization area, to **acquire a broad and deep understanding of computing** ("Universal Computing") **including the business aspect** of computing as the central and universal source of current and future industrial innovation. For this, we offer numerous possibilities to do the master thesis project **in close cooperation with companies and research institutes,** in particular also within the **Softwarepark Hagenberg,** a spin-off of RISC.

In principle, this master's program comprises **four semesters with minimum 140 ECTS points** (which is slightly more than the EU standard, since we offer and request a couple of extra general courses like "Working Techniques for Scientists" and "Entrepreneurship Training".

A bachelor degree (with 180 ECTS) in computer science, math or a related subject is the prerequisite for entering our master. Bachelor graduates who had fewer hard-core courses in computer science and math than 180 ECTS, **might need to spend an extra semester in our master program**.

Conversely, students who graduated from a bachelor or diploma study with more than 180 ECTS or who already earned extra ECTS after their bachelor at their previous university **may be eligible to enter at the second or third semester** of our master's program.

The possible specialization areas in the frame of the Universal Computing and Business master's program are numerous. They reflect the broad range of expertise of our faculty and adjust to the quickly evolving trends in computing, for example: machine learning, deep learning, artificial intelligence, automated reasoning, natural language processing, cognitive computing, natural language reasoning, heuristic algorithms, pervasive computing, internet of things, big data, cloud computing, web technology, mobile computing, knowledge management, data bases, business intelligence, software verification, testing, model based programming, software engineering, image processing, computer graphics, virtual reality, augmented reality, robotics, medical informatics, bio informatics, mathematical modeling, simulation, financial mathematics, industrial mathematics, educational software, computer algebra, numerical computation, symbolic computation, algorithm theory, formal methods, abstract state machines, complexity theory, mathematical logic, model checking, mathematical knowledge management, universal computing software systems, cryptography, coding theory, pseudorandom number generation, quasi-Monte Carlo methods …

We offer a lively **open community for our students** in the **"International Graduates Club"** and provide **individual coaching** for all phases of the study

including the application phase and the phase of transition to professional life and / or PhD study.

Due to the great success of the program in the past ten years (with over 150 graduates who now excel in their jobs at the industry or as PhD students), the number of study places will now be raised to max. 50 per year. **Applications for study places and a limited number of scholarships** are processed within the ranking on a first-come, first-served basis.

Details about the Master's Program

Application:

Send your application, by **March 31, 2017**, **to Professor Bruno Buchberger**, the head of the program:
bruno.buchberger@jku.at
with cc to Mrs. Betina Curtis, the CAO of the program:
betina.curtis@isi-hagenberg.at

The **application** must contain:
- CV
- motivation letter including favorite area(s) of specialization
- certificate of bachelor degree
- a detailed list of all courses you passed so far (for the bachelor degree and beyond): name of course, credit hours, grade
- recommendation letters by professors of your current university (preferably from professors with whom we have an academic cooperation)
- certificate of English as a study and working language.

(For the application, copies of the documents are sufficient. Originals will be necessary when you will have been accepted. All documents must be in English language!)

We **interview** all applicants via Skype.

Ranking:

Based on the information in the application and the interview, the applicants are ranked.

Tuition and fellowships:

The program is sponsored by governmental and company sponsoring. Depending on the ranking

- you have to pay full tuition (5000.- € per semester)
- you have to pay reduced tuition
- you need not pay tuition
- you need not pay tuition and you will receive, in addition, some fellowship for the second year (max. 3500.- €).

Living costs in Linz:

Typically, a student needs approximately 800.- € per month for living in Linz. Included in this amount are approximately 350.- € for a room in one of our well equipped dormitories as well as health insurance.

Entry point for the program:

We will carefully analyze the list of courses you passed during your bachelor study and, if applicable, the semesters after your bachelor and count all courses that fall into informatics and mathematics (and, to a certain extent, "business") and **determine, how many semesters** you will have to stay in our program for earning the "Master of Science" degree.

The "Master of Science" Degree:

All students will receive a "Master of Science" degree. The particular specialization area will be defined by the list of courses which you passed during your study and forms an integral part of the certificate.

"Joint Master of Science" Degree:

In case we credit a significant amount of course work beyond your bachelor study from a university different from ours, we are open to agree with this university on conferring a "joint degree" that mentions, on the master's certificate, the fact that you did your master's jointly at this other university and the JKU.

Introductory Training:

When you enter our program, you have to go through a special introductory training that comprises:
- Training in writing papers and giving talks
- Explanation training.

This training starts at Sep 1, one month before the official winter semester starts.

General courses:

In addition to the courses for your specialization area, all students have to pass a couple of general courses that span the depth and breadth of "Universal Computing":
- Training in Formal Thinking
- Software Engineering
- Data Science
- Entrepreneurship Training
- Research Surveys (of our faculty)
- Mathematical Software (Mathematica, Maple, etc.) as a Frame for Universal Computing

Special English and German Training:

Students who have a certificate for English as a working and studying language but whose English communication skills we do not find sufficient in the Skype interview will have to enroll into **our special English training**. This training starts with an intensive training month in August and is then continued during the winter and summer semester until a satisfactory level is reached.

For students who want to stay for a job in Austria after their master study, we recommend to spend some time for learning **German**. For this, we offer special courses.

Extra Credits:

For the Introductory training, the general courses and the language training course, you will earn extra credits that go 20 or more ECTS beyond the 120 ECTS EU standard for master programs.

Definition of your Specialization Area and Special Master's Curriculum:

At the beginning of your study in the frame of our program, we will discuss with you your study goals and interest, your background, your desired specialization area, and, also, the available sponsored or non-sponsored projects from companies, research institutes and **faculty. Based on this information you will determine an** individual curriculum and (at the beginning of the third semester) a **master's thesis project**.

After this, we will find a professor on our faculty who will be your **personal academic advisor** for your study and, in particular, for your master's thesis project.

Questions:

For questions concerning the content and scientific and educational aspects of the program, you may send an e-mail to

bruno.buchberger@jku.at

For questions concerning administrative details, write to

betina.curtis@isi-hagenberg.a

Web Site:

www.isi-hagenberg.at

(Please note that this homepage, at the moment, is partly obsolete. However, the basic information is still valid. It will soon be updated.)

Johannes Kepler:

Johannes Kepler gives the name to our university: He spent an important part of his scientific life (1611 until 1626) in Linz and founded a school that is considered to be a predecessor of our university. In addition, his universal view of science including mathematics and computing is our guiding line and inspiration for our international master's program "Universal Computing and Business". Our faculty, in close interaction with the next generation of our students, will develop what Universal Computing could and should be for our current age. Take part in this adventure!

Joannes Keplerus

(1611-1626: Kepler in Linz)