

Call for Applicants

The Education Academy of Computational Life Sciences (ACLS) seeks aspiring new students to join our program.

Admission Requirements

Candidates

Applications will only be accepted from master's students who have enrolled in the graduate majors outlined below.

School of Life Science and Technology	School of Computing	
Department of Life Science and Technology	Department of Mathematical and Computing Science	Department of Computer Science
-Graduate Major of Life Science and Technology -Graduate Major of Human Centered Science and Biomedical Engineering	-Graduate Major of Mathematical and Computing Science -Graduate Major of Artificial Intelligence	-Graduate Major of Computer Science -Graduate Major of Artificial Intelligence

Required Qualifications

Successful applicants will have:

- Awareness of the purpose of the Education Academy of Computational Life Sciences (ACLS)
- Willingness to learn and explore interdisciplinary fields
- Willingness to advance to the doctoral program

Selection Period

Candidates will be invited for a personal interview with the Selection Committee, immediately following their enrollment (April or October).

Please visit our website, "ACLS - Education Academy of Computational Life Sciences, Tokyo Institute of Technology", for the latest information on the academy, such as the schedule for orientation sessions.

<http://www.acls.titech.ac.jp/en/>

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Program for Leading Graduate Schools by The Ministry of Education,
Culture, Sports, Science and Technology in Japan

Life Science × Computer Science



Program for Life & Health Innovation Leaders
with Advanced Computer Science Skills



Tokyo Institute of Technology

**Education Academy of
Computational Life Sciences**

(ACLS)

Program for “Γ Type Specialists”

The Education Academy of Computational Life Sciences fosters students to create new value beyond their disciplinary boundaries.

Towards Collaboration between Life Science and Computer Science

Life science seeks to conduct comprehensive research of biological phenomena predominantly through a biology-focused approach, incorporating various disciplines, including physics, chemistry and medical science. Computer science takes information derived from diverse phenomena and activities and seeks to discover underlying principles through data analysis and knowledge processing. Until now, these two fields have developed independently, and a lack of mutual understanding has impeded attempts to solve issues collaboratively. However, life and health science underpins 21st century society, and to be a pioneer in this area, flexible collaboration to advance research and development in these two fields is necessary.

An Educational Program to Foster Outstanding Interdisciplinary Doctoral Talent

Tokyo Institute of Technology established the Education Academy of Computational Life Sciences (ACLS) in 2011. The faculty members from the School of Life Science and Technology, and the School of Computing work closely together to realize a groundbreaking interdisciplinary educational program. With funding support from the Program for Leading Graduate Schools* led by the

Ministry of Education, Culture, Sports, Science and Technology in Japan (MEXT), we work to nurture outstanding doctoral talent in life science and computer science who possess a high degree of proficiency in their specialty area along with essential knowledge in a secondary specialty area.

*Program for Leading Graduate Schools
<http://www.jpsps.go.jp/english/e-hakasekatei/>

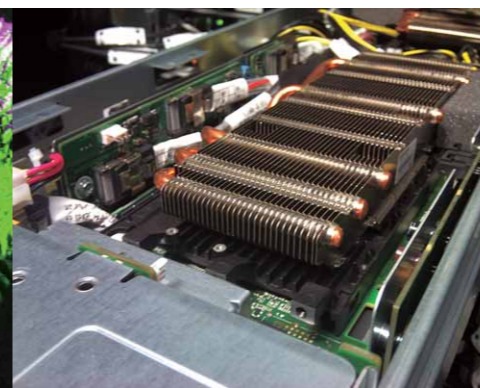
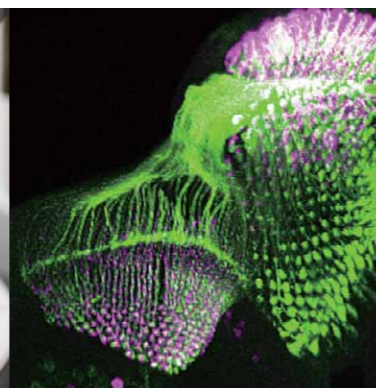
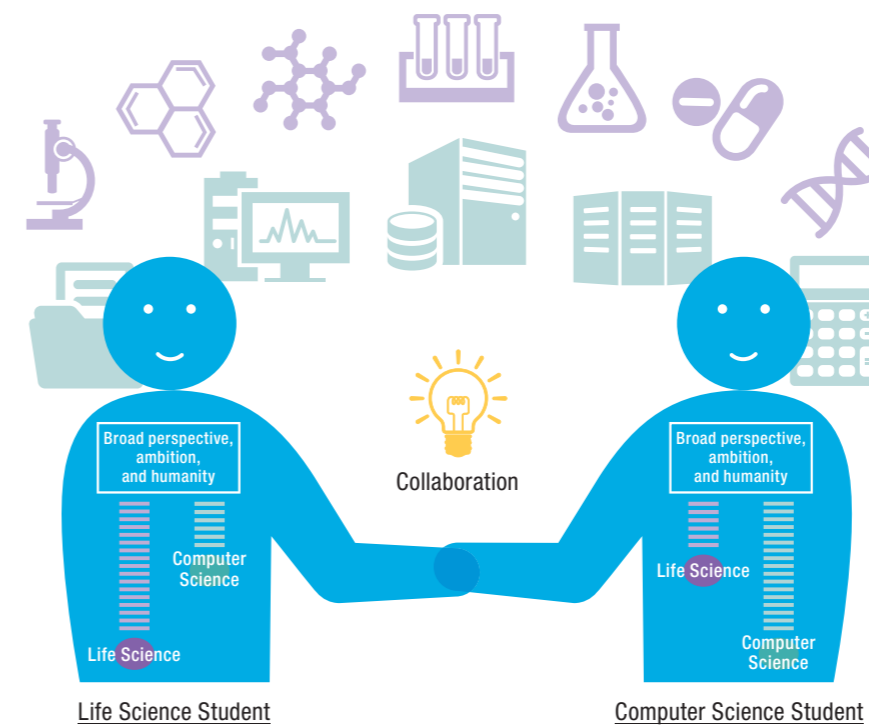
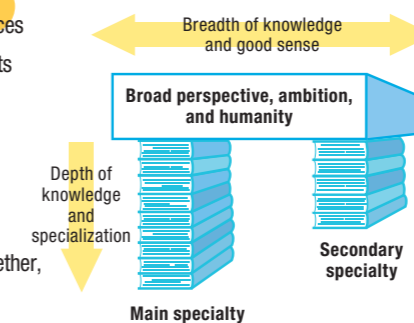
The program supports graduate schools developing world-class degree programs going beyond conventional specialist frameworks and aiming to develop talented students into globally active future leaders possessing a broad perspective and creativity.

Producing Active Leaders in Multiple Fields with a High Level of Specialization and Broad Knowledge

To become a leader in the field of life and health science, it is advantageous to have not only a high level of specialization in either life science or computer science but also the ability to develop the qualities of a “Γ Type Specialist” who possesses knowledge and experience in additional field. Our academy fosters outstanding Γ type specialists through a 5-year training course (combining master’s and doctoral programs). Our aim is to make contributions in creating new value—for pharmaceutical and medical equipment manufacturers along with food, chemical, diagnostic, health-related businesses and research institutes—that transcends the boundaries of these fields.

What are Γ Type Specialists?

The Education Academy of Computational Life Sciences uses the Greek letter Γ (gamma) to define specialists who possess a high degree of proficiency in their specialty area along with essential knowledge and experience in a secondary specialty area, linked by a broad perspective, ambition, and rich humanity. By facilitating students in different fields to study together, we aim to generate talent who can be active in interdisciplinary fields through helping them to deepen their understanding of each other’s ideas and values.



Contents

P.3 ACLS Round-Table Discussion

Director, Prof. Yutaka Akiyama, and three students from the academy share their perspectives on the Education Academy of Computational Life Sciences.

P.5 Curriculum Overview

Students join the academy while enrolled in their respective graduate majors and follow a prescribed curriculum in interdisciplinary fields of life and computer sciences to become Γ type specialists.

P.6 Introducing Our Unique Program

The Education Academy of Computational Life Sciences supports ambitious students from a variety of perspectives. Graduate students studying in life science or computer science can access a range of study opportunities through participation in the programs offered by the academy.

- **Fostering Γ Type Qualities through Collaboration with Different Fields**
 - Creative Collaboration Works
 - Molecular Simulation
 - International Business Plan Competition
- **Reinforcement of Intercultural Communication Skills**
 - Science and Technology Communication Subjects
 - International Summer Schools
 - International Internship
- **Career Path Support**
 - Short-term Internship
 - Global Career Seminars
 - Industry Mentor Programs
- **Encouraging Entrepreneurship**
 - Introduction to Business Plan
 - Participation in International Events
- **Student Support**
 - Scholarship Offers
 - Travel Expenses Support
 - Dedicated Mentor System
 - Laptop Loans
 - Tokyo Tech Supercomputer “TSUBAME” Access Grant

P.11 Introducing students who find great success through learning at ACLS

How does studying at ACLS encourage personal development? We spoke to actively participating students to find out.

P.13 Course Schedule

This is a 5-year combined master’s and doctoral program. Each year, student performance evaluations are conducted to determine whether they can continue in the program or at the same or higher scholarship rank.

*The Tokyo Institute of Technology carried out education reform in April 2016, changing the structure of its postgraduate study program from 6 Schools and 45 Departments to 6 Schools and 19 Departments. The department names of the students featured in this pamphlet are those at the time of the interview.

ACLS Round-Table Discussion

Nurturing Leaders Who Will Create New Value by Linking Potentials between Different Fields

What is the significance of studying in the Education Academy of Computational Life Sciences (ACLS)?
 What capabilities do students attain and how can these skills be leveraged in society?
 We asked Director, Prof. Yutaka Akiyama, and three students from the academy to share their thoughts.

Akiyama ACLS was established in 2011, and I feel that recently it has become common practice for both the faculty and students to overcome the barriers between research fields and campuses through collaboration. What do our students think about this?

Suzuki In the past, I had very few opportunities to explain my main field of specialization to students in other fields. However, by joining ACLS, I have started to explain computer science to teachers and students of life science, which has taught me a lot. Initially, I was bewildered because of the different points of view and values.

Akiyama First, it is important for you to experience the differences personally. It is then possible to think about how to explain your main specialty to another person in a comprehensible way, and to take action.

Mantoku I agree. Since the thought process varies for different fields, the approach to problems will also vary. Interdisciplinary group work to solve problems has provided me with new perspectives, which has been very useful.

Yano When collaborating with students in other fields, often it is difficult to develop a strategy unless you are aware of your own strengths. Once everyone understands each other's talents, your role becomes clearer. It gave me the chance to view myself more objectively.

Akiyama In the process of interacting with people from different fields, you build effective communication skills, meaning that what experience students gain here will certainly benefit them in their future career. I think students also acquire leadership skills then. New industry trends cannot be achieved by working alone. It is important to create strong collaborative teams with people in various fields and then take action. I believe this is the precise form of leadership exercised by T⁺ type specialists. With that said, what vision do you each have for your future?

Mantoku I hope to make business proposals combining life science and the medical field as a consultant in the emerging healthcare industry. I originally thought that life science and computer science were unrelated fields, but at ACLS I came to realize that there is a

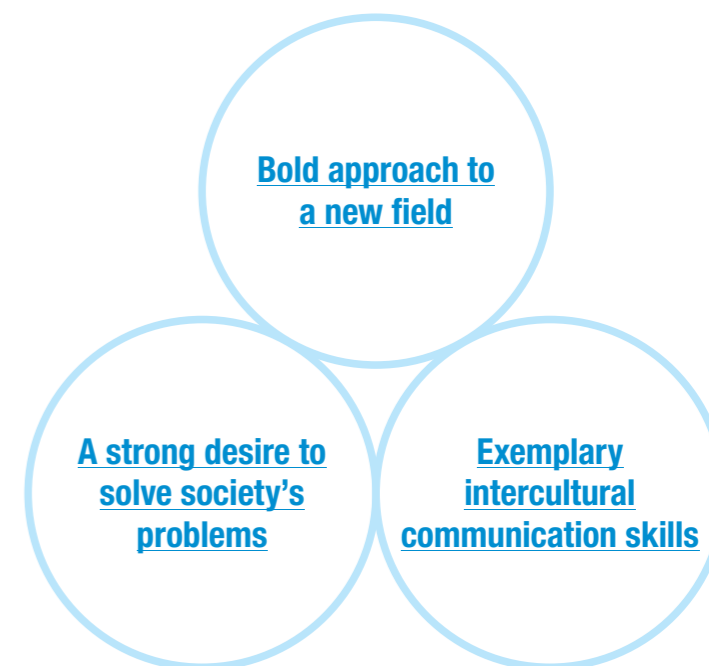
strong bond between them. Similarly, I want to emphasize the importance of an approach that sees possibilities in new combinations of different fields. I want to continue to nurture new collaborations long after I enter the workforce.

Suzuki After I obtain my doctorate, I will work for a major IT company in the research division. I hope that I will be able to collaborate with people from other fields to gain new know-how and to pursue my career as a researcher applying newly found knowledge to different areas.

Yano I also hope to be a consultant in the future or to use my skills in a company's research center. My aim is not only to collaborate within natural science fields but also with social science fields such as economics and sociology in an effort to solve various problems in society.

Akiyama ACLS offers a variety of opportunities to students, and I believe that the interaction that arises is producing results beyond our expectations. The feedback from everyone here reflects that the strengths we are targeting in the program—namely a fighting spirit, an desire to solve society's problems, and effective communication skills—are all taking firm root. For example, we hope that students based in life science research laboratories and also possess a deep interest in computer science will become leaders who link together a variety of different fields when they enter the workforce. The new range of subjects delivered by ACLS have received high praise, including our university's education awards for two consecutive years. But more importantly, it makes us happy to see everyone growing and showing great promise. I am pleased that the T⁺ type specialists graduating from our academy will continue to be active in interdisciplinary fields.

Three Capabilities Strengthened through This Program



Profile

Yutaka Akiyama (2nd from left)
 Director of Education Academy of Computational Life Sciences,
 Professor, School of Computing

Shuji Suzuki (left)
 PhD student
 Computer Science
 Graduate School of Information Science and Engineering

Akiko Mantoku (2nd from right)
 PhD student
 Biological Information
 Graduate School of Bioscience and Biotechnology

Masahiro Yano (right)
 PhD student
 Biological Information
 Graduate School of Bioscience and Biotechnology

*The department names of the students are those at the time of the interview.

Select and Study Subjects Leading to Who You Aim to Be

At the Education Academy of Computational Life Sciences, not only do we offer an interdisciplinary curriculum in life and computer sciences but also conduct group work where students from different fields can collaborate and gain understanding about each other's perceptions and values. Our education program works to provide Creative Collaboration Works, International Summer Schools, lectures and events, where students from different fields work on projects through collaborative efforts.

Credit Requirements to Complete This Program

Students in the Education Academy of Computational Life Sciences are required to obtain the number of credits stipulated in the table on the right in each of the subject groups a) to d) by the end of their master's and doctoral courses. It is also necessary for the each student to obtain the required number of credits stipulated by the graduate majors they choose from within the department they belong to.

	By the End of Master's Course	By the End of Doctoral Course
a) Fundamental Subjects for Γ Type Specialist Development	Minimum 4 credits (including 4 credits of compulsory subjects)	Minimum 6 credits
b) Advanced Subjects for Γ Type Specialist Development	Minimum 2 credits	Minimum 5 credits
c) Science and Technology Communication Subjects	Minimum 4 credits (including 4 credits of compulsory subjects)	Minimum 6 credits
d) Internship Subjects	Minimum 1 credit	Minimum 3 credits
Subjects in the Student's Graduate Major	Credits stipulated in each graduate major (including master's thesis research)	Credits stipulated in each graduate major (including doctoral thesis research)

A complete list of subjects is available here. <http://www.acls.titech.ac.jp/en/curriculum/>

Click!

Students Aim to Become a Γ Type Specialist by Selecting Subjects According to Their Objectives

<Example study plans a) Fundamental subjects, b) Advanced subjects>

*In addition, students must enroll in subjects from c) Science and Technology Communication Subjects and d) Internship Subjects.

Life Science Students "Modeling Expert"

1st Year Master's Course, Term 1	1st Year Master's Course, Term 2	2nd Year Master's Course and after
<ul style="list-style-type: none"> Workshop on Group Problem-Solving (ACLS) (Fundamental Subjects) Modeling of Continuous Systems (Fundamental Subjects) 	<ul style="list-style-type: none"> Creative Collaboration Works on Life Sciences (ACLS) (Fundamental Subjects) Design Theory in Biological Systems (Advanced Subjects) 	<ul style="list-style-type: none"> Bioinformatics (Advanced Subjects) Topics in Computational Life Sciences (ACLS) (Advanced Subjects), etc.

Through the lectures and seminars, I gained a grasp of computer science, which was previously an unknown field to me.



Shoya Yasuda
Computational Intelligence and Systems Science Interdisciplinary Graduate School of Science and Engineering

Life Science Student "Making the Most of TSUBAME"

1st Year Master's Course, Term 1	1st Year Master's Course, Term 2	2nd Year Master's Course and after
<ul style="list-style-type: none"> Workshop on Group Problem-Solving (ACLS) (Fundamental Subjects) Workshop on Building Advanced Computer Network (Fundamental Subjects) 	<ul style="list-style-type: none"> Creative Collaboration Works on Life Sciences (ACLS) (Fundamental Subjects) Molecular Simulation (Advanced Subjects) 	<ul style="list-style-type: none"> High Performance Computing (Advanced Subjects) Multimedia Information Processing (Advanced Subjects), etc.

Through collaboration with computer science students, I lost my aversion to computer simulation.



Eri Shibata
Biological Information Graduate School of Bioscience and Biotechnology

Computer Science Student "Effective Player"

1st Year Master's Course, Term 1	1st Year Master's Course, Term 2	2nd Year Master's Course and after
<ul style="list-style-type: none"> Workshop on Group Problem-Solving (ACLS) (Fundamental Subjects) Bioinformatics (Advanced Subjects) 	<ul style="list-style-type: none"> Creative Collaboration Works on Life Sciences (ACLS) (Fundamental Subjects) Bioinformatics (LST) (Fundamental Subjects) 	<ul style="list-style-type: none"> Introduction to Bioethics (ACLS) (Advanced Subjects) Topics in Computational Life Sciences (ACLS) (Advanced Subjects), etc.

Initially, I was surprised by the significant differences between computer and life sciences in terms of the terminology and assumptions.



Motohiro Akikawa
Computational Intelligence and Systems Science Interdisciplinary Graduate School of Science and Engineering

Computer Science Student "Life Science Focus"

1st Year Master's Course, Term 1	1st Year Master's Course, Term 2	2nd Year Master's Course and after
<ul style="list-style-type: none"> Workshop on Group Problem-Solving (ACLS) (Fundamental Subjects) Molecular Biology I (Fundamental Subjects) Biochemistry I (Fundamental Subjects) 	<ul style="list-style-type: none"> Creative Collaboration Works on Life Sciences (ACLS) (Fundamental Subjects) Biochemistry II (Fundamental Subjects) 	<ul style="list-style-type: none"> Cell Physiology (Advanced Subjects) Fundamentals of Research Application for Life Innovation (Advanced Subjects), etc.

The large numbers of classes combining life and computer sciences provide knowledge directly related to our research.



Dashdemberel Batchunag
Mathematical and Computing Science Graduate School of Information Science and Engineering

All-Round Support for Developing Interdisciplinary Leadership

Fostering Γ Type Qualities through Collaboration with Different Fields

In order to become a Γ type specialist, experience in collaboration with other fields is essential.

At the Education Academy of Computational Life Sciences, we offer many subjects that allow students to collaborate with students from other fields. We illustrate this with a few key examples shown below.

Case 1

Creative Collaboration Works

Groups are comprised of students from both life science and computer science to solve problems collaboratively leveraging their respective specialties. Through the work, students develop skills for discerning correct judgments from large quantities of information. They also deepen their understanding of each other's fields of specialization and thought processes with the goal of developing skills for smooth collaboration in a practical setting.



We have actually carried out experiments that I had previously only seen on paper, and this has allowed me to realize the importance of the data we use. I believe that through discussions I am acquiring the foundation for a mutual understanding of life science and computer science.



Keisuke Yanagisawa
Computer Science Graduate School of Information Science and Engineering

I was surprised to learn that molecular simulation is frequently used in corporate sales activities. In the exercises in which we used the state-of-the-art software for drug development we were able to experience the power of high-performance computing.

Case 2

Molecular Simulation

Molecular simulation is used widely from basic research to drug development. In the exercises, students acquire hands-on experiences of biomolecular simulation by using software actually applied to research and development in the various fields, leveraging Tokyo Tech's supercomputer TSUMABE. We foster their knowledge and skills to be able to meet the society's needs.



Shimpei Otsuka
Bioengineering Graduate School of Bioscience and Biotechnology



Case 3

International Business Plan Competition

We conduct business planning seminars where groups of cooperative international students develop a business plan proposal on designated international patents. Through lectures presented by venture business entrepreneurs on commercialization and starting businesses, students become familiar with realistic business plan proposals. The competition helps both to foster a broad perspective and collaborative work skills.



In our struggles with unfamiliar business terminology, we developed a plan by working together with students from abroad. I learned a lot as I discovered marketing and corporate concepts for the first time.



Yuni Todate
Computational Intelligence and Systems Science Interdisciplinary Graduate School of Science and Engineering

>> All-Round Support for Developing Interdisciplinary Leadership

Reinforcement of Intercultural Communication Skills

In order to play an active role on a global stage, it is necessary to develop not only linguistic skills, but also the techniques and experience to advance communications with others smoothly. ACLS students are given various opportunities to engage in dialogue with students from other cultures as well as fields of specialization. Students will develop resilient communication skills through a variety of international programs.

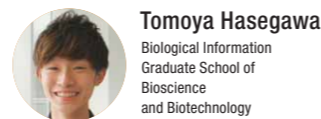
Case 1

Science and Technology Communication Subjects

Using original ACLS textbooks, we conduct small group classes on four subjects: Communication, Debate, Presentation and Writing. Students acquire English speaking and writing skills that enable them to clearly and convincingly express their ideas in situations they are likely to encounter in their field of specialization.



The courses are practical. I learned how to use my vocabulary to explain words I don't know and also how to avoid silences in conversation. It has helped me in presentations at academic conferences and in the laboratory.



Tomoya Hasegawa
Biological Information Graduate School of Bioscience and Biotechnology

I played the hefty role of group work chairperson, and I encountered many difficulties. However, this allowed me to cultivate the capacities required of a leader. In addition, through interacting with renowned researchers and students overseas, I was also able to acquire a new perspective on science.

Kengo Tejima
Life Science Graduate School of Bioscience and Biotechnology



This summer school provided me lots of new encounters and they helped me to add a new focus to my research. Through the group work, I could brush up my ability to collaborate other people who are in different fields.

Alejandra Mejia Tobar
Information Processing Interdisciplinary Graduate School of Science and Engineering



Case 2

International Summer Schools

Students take their initiative to host summer schools abroad. By organizing everything from invitation of foreign lecturers and students to program planning and implementation, they develop skills in English and become skilled in collaborating with others to ensure the success of events.



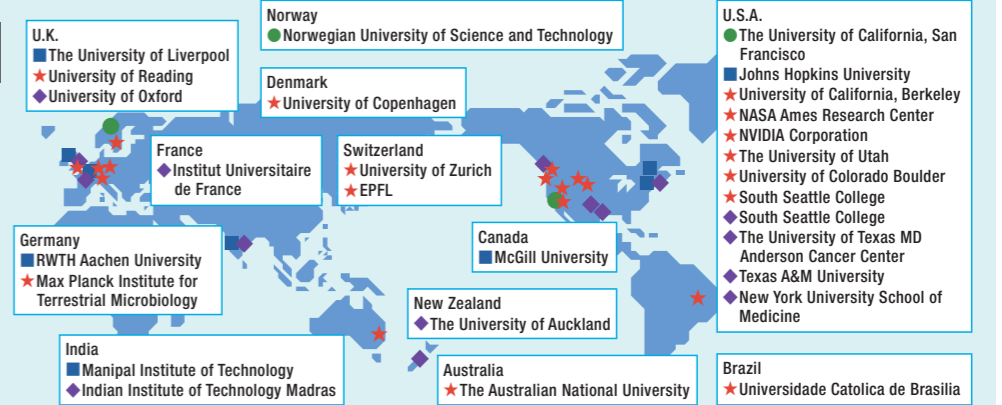
University of Oxford, U.K., in 2015

Case 3

International Internship

Students undertake a minimum three-month overseas internship before finishing their doctoral course. This helps them to gain confidence and develop skills necessary for global leadership.

Number of students	
2012 ● 2	2014 ★ 15
2013 ■ 5	2015 ◆ 8



RWTH Aachen University, Germany, in 2013



Initially it was a bitter and difficult adjustment, but once I adapted to life abroad, I enjoyed every day. If you are interested in going overseas, I encourage you to proactively accept the challenge of studying abroad.

Kenta Nohara
Bioengineering Graduate School of Bioscience and Biotechnology

Prepare yourself for stimulations every day that cannot be experienced in Japan. Meet incredible people; encounter the thoughts of those from other countries and cultures, and think for yourself, discuss, and learn. Leave the comfort of Japan and broaden your horizons!

Toshitaka Matsubara
Bioengineering Graduate School of Bioscience and Biotechnology



NASA's Ames Research Center, U.S., in 2014



University of Oxford, U.K., in 2015



At ACLS, I developed the skills to communicate with those from different backgrounds; this has been extremely useful overseas. I believe that my overseas intern experience would give me great confidence when working with people from other countries in the future.

Akiko Mantoku
Biological Information Graduate School of Bioscience and Biotechnology



>> All-Round Support for Developing Interdisciplinary Leadership

Career Path Support

ACLS aims to foster doctoral talent who are active in industrial, government and international organizations. We provide programs that allow students to consider a wide variety of career paths, and visualize their future activities.

Case 1

Short-term Internship

ACLS impose short-term industry internships whereby students experience on-site training at selected companies. Study and training in a corporate environment provides students with an excellent opportunity for thinking about active careers in industry.



Through working with international staff at the software development department, I was able to improve on professional working ethics and understand Japanese corporate procedures. Furthermore, I could refresh my coding skills for future use in my research.



Sathiyanthavel Mayuri
Bioengineering
Graduate School of Bioscience and Biotechnology

Encouraging Entrepreneurship

ACLS encourages a positive approach to new fields. We conduct special lectures to foster entrepreneurship targeted towards solving society's problems, and promoting participation in international events.

Case 1

Introduction to Business Plan

Special lectures based on the real experiences of multiple venture business managers, students learn the know-how necessary to establish their own ventures. Business plans are created in groups and invariably lead to lively discussions.



ACLS provides numerous opportunities to think about careers. I am now aiming to become a new type of PhD who works different way. And I established my own venture company (See page11).



Yoshinori Mizuguchi
Biological Information
Graduate School of Bioscience and Biotechnology

Through communications with industry people, I observed how ventures get started. I feel I have moved one step closer to becoming a global leader.

Tomohiro Ban
Computer Science
Graduate School of Information Science and Engineering



Case 2

Global Career Seminars

ACLS conducts interactive career seminars with guest speakers from global corporations including the pharmaceutical industry, international organizations and think tanks etc. These round-table discussions provide students with a valuable opportunity to have direct discussions with PhDs who are active in industry.



I could learn the importance to connect research findings into business. I was impressed that most of the technology managers are professionals with a PhD degree. It made me think about my future paths as PhD holder.

Alfredo Esquivel Chavez
Bioengineering
Graduate School of Bioscience and Biotechnology



Case 2

Participation in International Events

Every year ACLS students participate in the Association of University Technology Managers (AUTM), held annually in the U.S., where students are able to learn how to turn an idea into a business. The event provides an excellent opportunity for students to interact with global venture capitalists, university personnel and entrepreneurs.



Case 3

Industry Mentor Programs

ACLS invites young researchers and managers who are active in industry as an "Industry Mentor." They provide students with the chance to directly ascertain a variety of information, such as personality development and critical thinking style demanded by industry. Collaborative research involving students and Industry Mentors also takes place.



It was immensely useful when Industry Mentors talked about recent trends in industry and about personnel training. At the meeting with mentors, I was able to deepen my understanding of the options after receiving my doctorate—in addition to continue my career at university, it might also be possible to do research at a company.

Nobuaki Yasuo
Computer Science
Graduate School of Information Science and Engineering

Check!

Student Support

The Education Academy of Computational Life Sciences provides support for students in a variety of ways.

•Scholarship Offers

Students approved to join the program are eligible to receive a scholarship. This scholarship is awarded in five ranks—SS, S, A, B and C—based on the performance of the student. (Maximum 240,000 JPY/month)

•Travel Expenses Support

Travel expenses are provided for attendance at international conferences, etc.

•Dedicated Mentor System

ACLS assigns each student with a teacher who provides in-depth advice and guidance on developing study plans while monitoring their progress.

•Laptop Loans

Students can borrow laptop computers with necessary software installed free of charge.

•Tokyo Tech Supercomputer "TSUBAME" Access Grant

Students are permitted extensive access to our supercomputer "TSUBAME".



Introducing students who find great success through learning at ACLS

Creating a Society with Zero Illnesses, and Establishing My Own Venture Company

How does the learning at the Education Academy of Computational Life Sciences (ACLS) lead to personal development?
How does it add value to students when they start working in society?
We spoke to Yoshinori Mizuguchi, who actively and energetically participates in the ACLS program, and who has already established his own venture company.

Various seminars and events helped cultivate practical skills and leadership

– What were your reasons for participating in ACLS? Can you also tell us about the research you are doing as a graduate student?

I did research into virus remedies when I was attending a technical college and I thought, back then, that one day I would like to contribute my own research results to society by creating a “zero-illness” society. My current research theme as a graduate student is regenerative medicine—I use human cells to create three-dimensional internal organs. On my research I need to use large data sources such as gene database. In addition to life science it was also necessary for me to acquire knowledge and techniques used in information technology. To learn fundamentals and practical skills related to information technology, I joined ACLS.

– Which subjects do you think have benefited your personal development?

First, the class “Creative Collaboration Works” was useful. There are rare opportunities for people with a background in life science to interact with students studying information technology. Cooperating with them to solve problems has fostered my ability to work in a team with people from other fields in order to achieve team goals—this will be valuable even after I finish my education at the university. Secondly, in 2014, I attended International Summer School at Purdue University, in the U.S., and I was chosen to lead the executive committee; about fifty of us worked as a team to lead the summer school to success. Collaborating with students at Purdue University, we spent a year making preparations and they were an extremely meaningful experience. Moreover, my participation in business-related subjects, seminars and internships, and extracurricular events helped greatly in establishing my venture company afterwards. In the extracurricular events, in particular, I had the honor of receiving first prize at the First Bioscience Grand Prix and, together with students from different fields



Profile

Yoshinori Mizuguchi

PhD student
Biological Information
Graduate School of Bioscience and Biotechnology

Awards Received

- First Prize, First Bioscience Grand Prix
- Gold Award, EDGE Innovation Challenge Competition 2015

in leading programs at their universities, I received the Gold Award in the EDGE Innovation Challenge Competition 2015, an ideas competition hosted by the Ministry of Education, Culture, Sports, Science and Technology’s EDGE (Enhancing Development of Global Entrepreneur) program. All of the experiences have given me a great deal of confidence.

Challenges in extracurricular contests opened the way to establishing my own venture company

– You are one of the founding members of Metagen Inc. What sort of company is it?

Using cutting-edge technologies such as metabolomics (exhaustive metabolite analysis) and metagenomics (the analysis of genome sequences in

bacterial populations), Metagen analyzes human stool samples and is developing methods to connect this data to useful healthcare information. The objective of our company is to contribute to society by providing this novel knowledge. We also seek to identify the mechanisms by which aberrations in intestinal environments lead to illness—which presently is not clear—and thereby more forwards to achieve a “zero-illness” society. At present, our business is primarily involved in collaborative research with a few companies, and we are considering to develop products that help regulate the intestinal environment.

– Why did you decide to establish your own company, and what were the circumstances behind your decision?

I wanted to contribute the results of my research to society. I realized the best way to do this would be to

foster a close relationship with society rather than spending all my time in the laboratory. This inspired me to start my own company.

It became a reality when I proposed a business model where a customer can get his/her health data obtained by analyses of his/her stool samples. This proposal was presented at the First Tech Plan Grand Prix, which was hosted by Leave a Nest Co., Ltd., where I was an intern. Unfortunately, my proposal was deemed “difficult to commercialize” and it was rejected. However, Yukihiro Maru, president of Leave a Nest Co., Ltd. gave me a second chance when he introduced me to Shinji Fukuda, Project Associate Professor at the Institute for Advanced Biosciences, Keio University, and an expert in the field of intestinal environment. He also had the aspiration of establishing his own venture company, and we immediately made a connection. Less than half a year after we met first, we started our own company. Dr. Takuji Yamada, from School of Life Science and Technology at Tokyo Institute of Technology, also joined us. My partners possess knowledge and technical expertise in different fields of research. This enabled us to take a major step towards achieving our goals.



In the laboratory, Mizuguchi applies himself to regenerative medicine research

– So, is your business completely different to the research you conduct as a PhD student?

I recognized that in order to achieve a zero-illness society, it was imperative to focus on applying both treatments such as regenerative medicine on the one hand and preventative medicine on the other; and as a result I came up with the idea of looking at the intestinal environment. Intestinal bacteria have a massive influence on our health; in recent years, research has

shown that it has an impact on a variety of illnesses including not only colorectal cancer and inflammatory bowel disease, but also diabetes, liver cancer, kidney dysfunction, and even autism. I believed that focusing on the intestinal environment would open rich perspectives into new health care research.

Participate in ACLS, and endeavor to make your dreams come true

– How have you exploited the things you learned at ACLS when establishing and operating your company?

From the business-related subjects and seminars, I learned how to create business plans. The leadership skills I developed at the International Summer School have been useful in directing the corporate organization, while the extracurricular events—where I interacted with students from other universities—have trained me to view everything from a variety of perspectives and consider different methods of thinking.

– What are your ambitions for the future?

First of all, in order to further develop the field of regenerative medicine, my aim is to eagerly pursue my own research and complete my dissertation. I intend to focus on the development of highly functional biomaterials that control cell proliferation and differentiation as well as their histogenesis. By constructing a three-dimensional space optimized for a wide variety of different cells, I want to develop technologies that allow the free creation of designed



Metagen Inc. Tsuruoka Research Institute cut the ribbon at the opening ceremony (Mizuguchi: second from left)

internal organs and tissues. With regards to my business activities at this moment, we are solely focusing on corporate services, and within three years we plan to commence private-user services. Using the vast amounts of data stored in our database, we aim to expand our services to include consultation in an effort to build good enterobacterial flora tailored for each client’s intestinal environment, and provide advice for enhanced diets. In addition, by promoting self-medication that improves intestinal environments, we hope to realize a comprehensive preventative medicine program that prevents disease before it occurs.

– Do you have any advice for students who are considering participating in ACLS?

As a potential young leader, you deserve to challenge your ambitions by taking initiative with your unique visions. Your field of action is not only in Japan but in the entire world. ACLS provides an environment that can support you in such activities. I strongly recommend you to participate in ACLS and endeavor to make your dreams come true.

VOICE



Takuji Yamada
Associate Professor

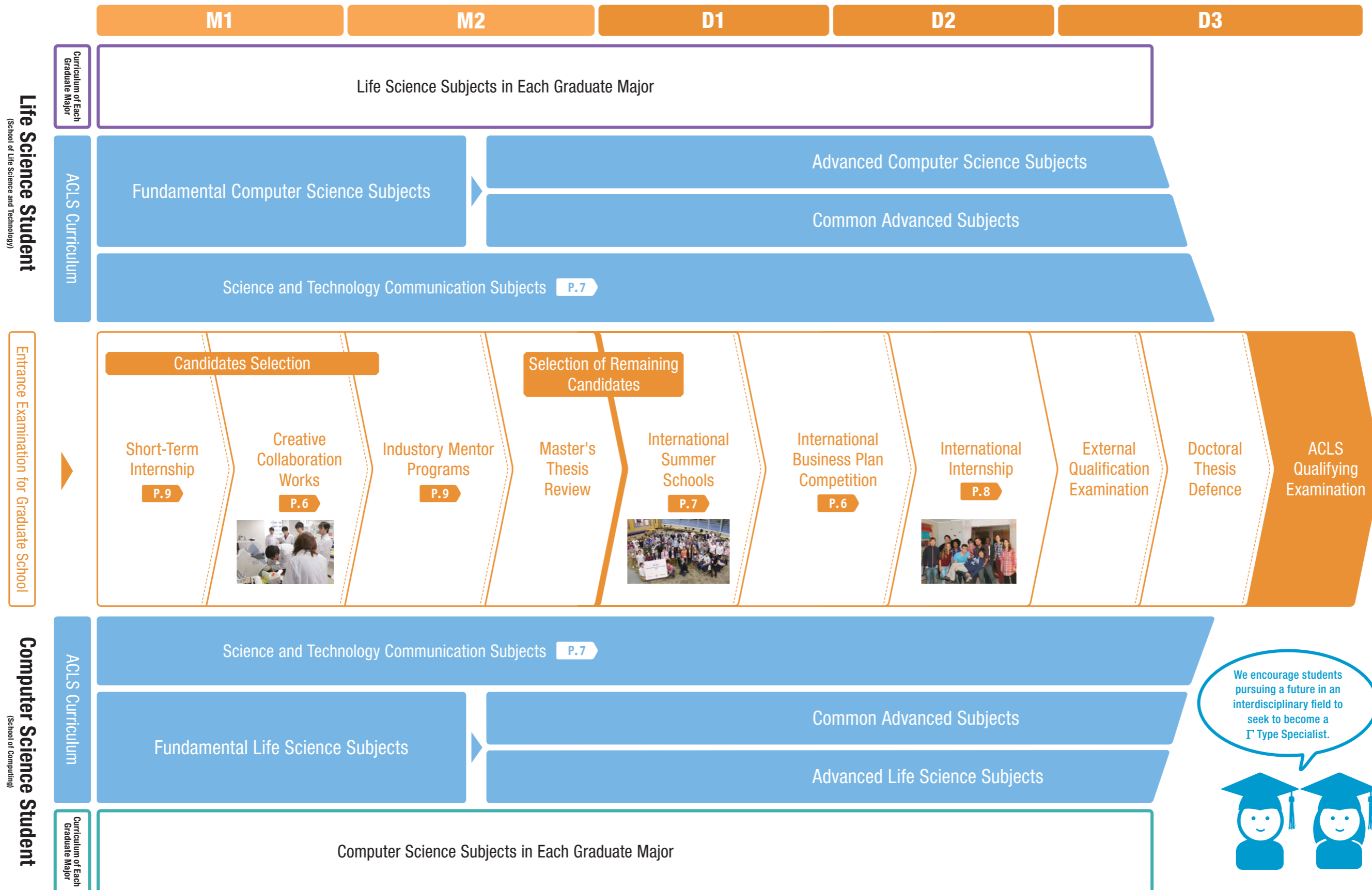
School of Life Science and Technology,
Tokyo Institute of Technology
Executive Vice-President, Metagen Inc.

It is not easy to succeed both in carrying out research as a PhD student and in establishing a venture company. However, what is extraordinary is that Mizuguchi is working on both activities with great enthusiasm. I feel his success is because of his audacious ambition to confront new challenges and his ingenious problem solving skills. Metagen Inc. aims to control and design human intestinal environments and provides a range of services that utilize cutting-edge technologies. As a venture company established at Tokyo Institute of Technology, we are eager to show how businesses can benefit from science.

The Road to Becoming a Γ Type Specialist



The Education Academy of Computational Life Sciences provides attentive support to students through an enriching program that will help students to become Γ type specialists.



We encourage students pursuing a future in an interdisciplinary field to seek to become a Γ Type Specialist.

Birth of a Γ Type Specialist

Obtaining Doctoral Degree & Completing ACLS Program

Success in industry-government-academic organizations related to the fields of drug discovery, food industry, chemistry, clinical instruments and diagnosis, health industry, etc