Introduction to SEIC

✓ What is it?

✓ How to sign up

✓ How to prepare

29 June 2020

Edited by:
G. Maeda
革新的宇宙利用実証ラボラトリー
Laboratory of Lean Satellite Enterprises and In-Orbit Experiments (LaSEINE),
Kyushu Institute of Technology (Kyutech)
Kitakyushu, Japan

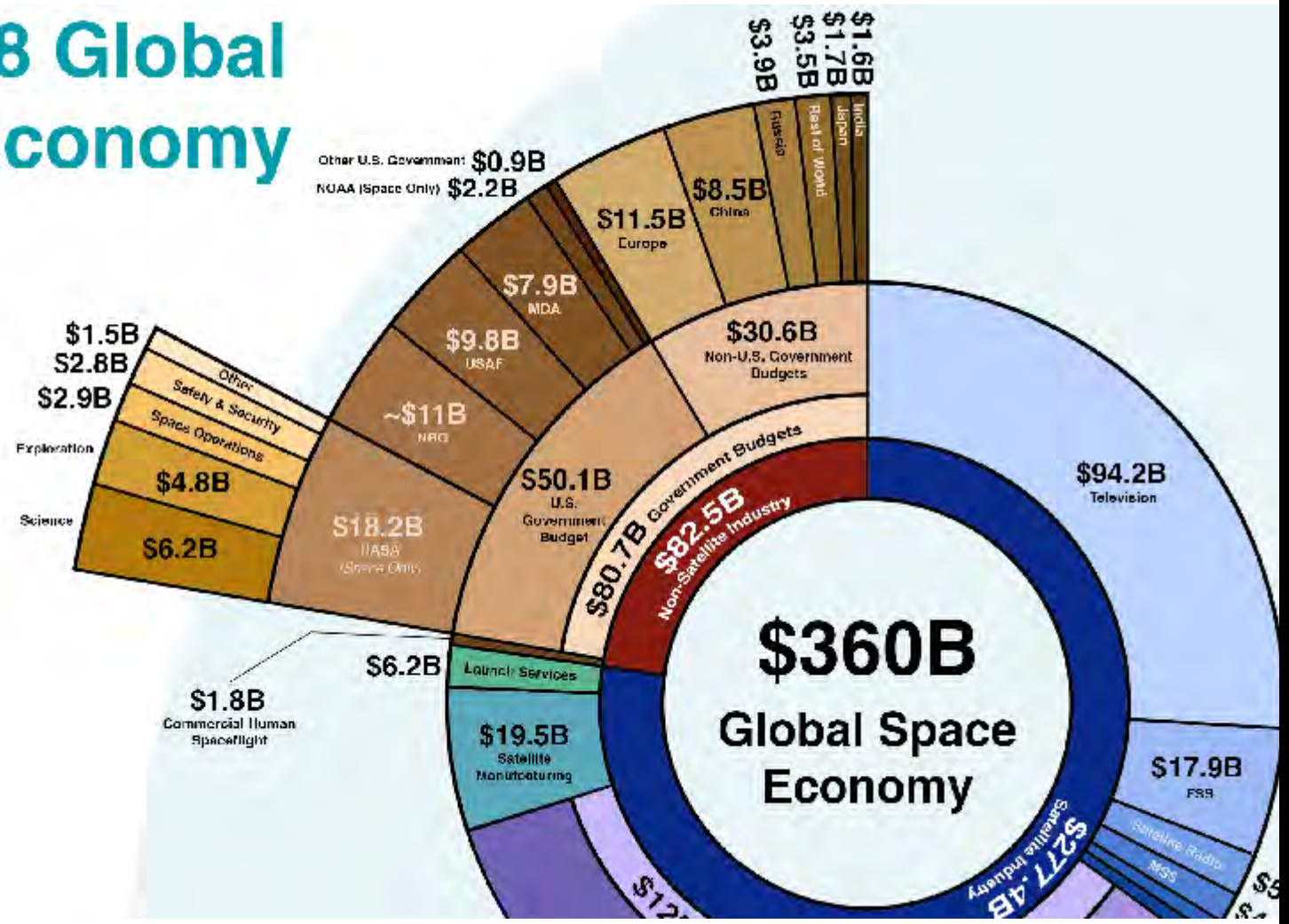
Space Engineering International Course

Kyutech
Kyushu Institute of Technology

✓What is it?

Note: **On the last few pages of this document, after Page 32, you can read comments by some SEIC alumni about their SEIC experience.**

The 2018 Global Space Economy



***2018 Global Space Economy*, by Bryce Space and Technology**
https://brycetech.com/reports

Today, the global space economy is huge.

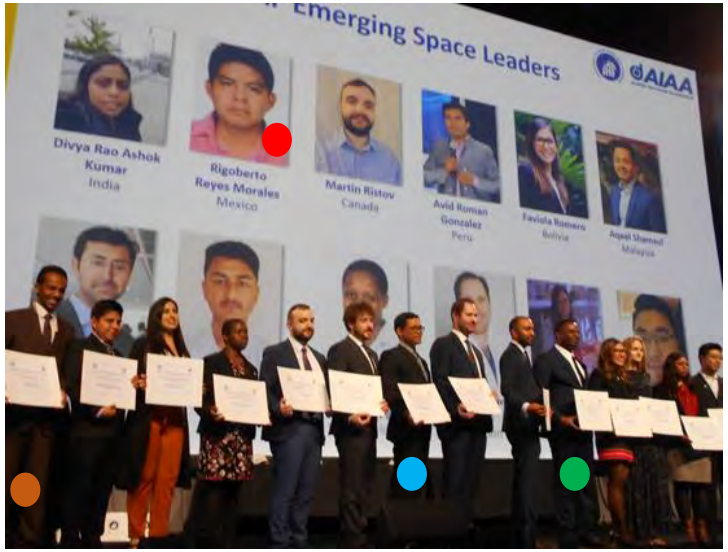
In 2018, it was 360 billion USD and is growing by at least ten percent per year.

SEIC seeks to prepare you for this high-growth economy as a highly-skilled global engineer.

What is SEIC?

It is a post-graduate engineering program at Kyutech in Japan.

SEIC leads to a masters degree (takes two years) or a Phd (takes three years). It is taught in English so that we can attract the best engineering students from all corners of the world.



Four SEIC students (Mexico, Nigeria, Philippines, and Sudan) receive *Emerging Space Leader* (ESL) awards during 2019 IAC in Washington, DC.

DO REAL SATELLITE PROJECTS

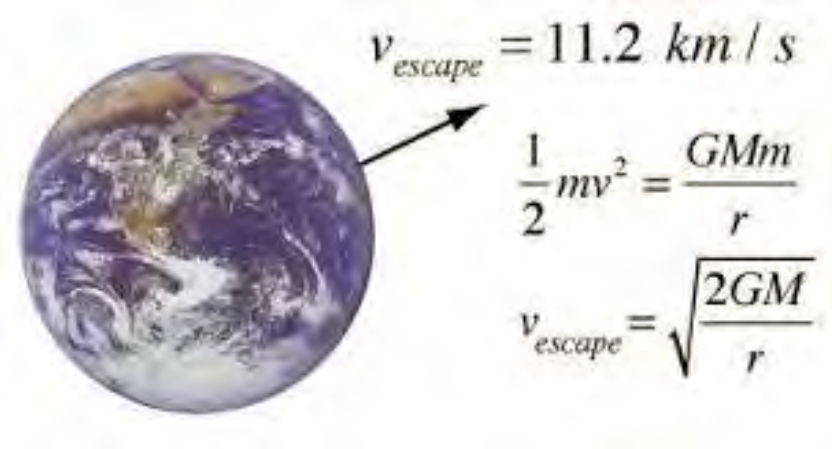
SEIC is explained as four topics

I. Highlights
II. Components of SEIC
III. Career development opportunities
IV. Space projects

COVERED ON THE NEXT FEW PAGES

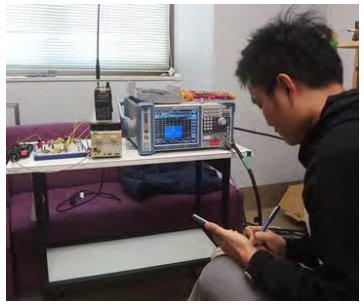
I. Highlights

- Lectures based in English
- Rigorous space engineering curriculum
- Multi-cultural environment
- Japanese 日本語 lessons are provided
- Discover superb Japanese food & culture



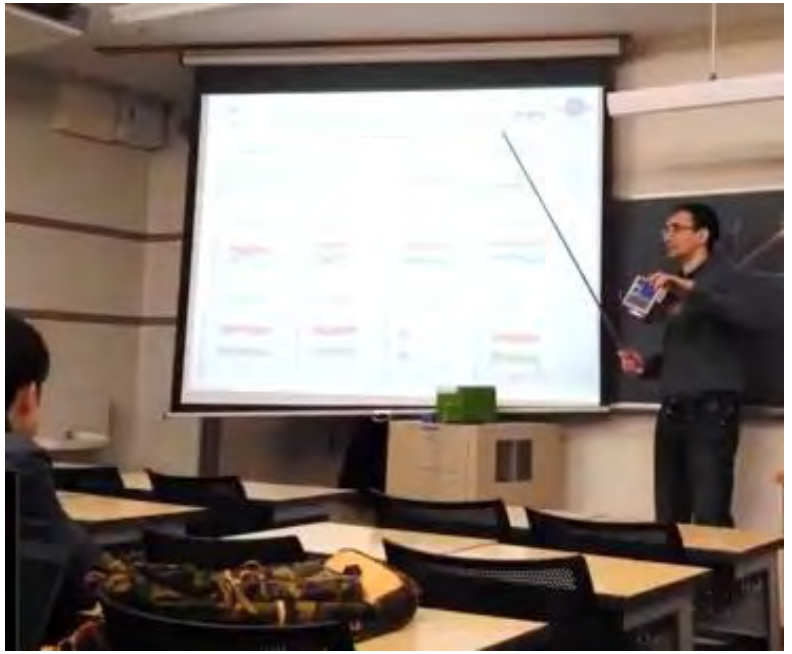
和食

II. Components of SEIC



SEIC is structured around four components:

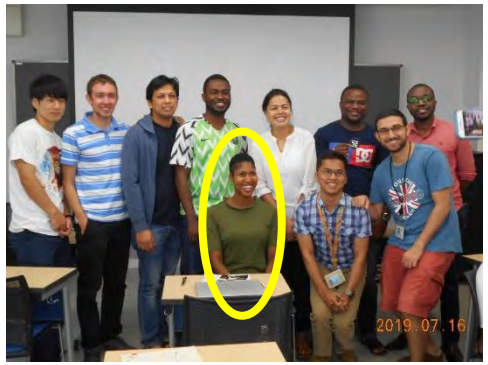
- **Research under supervision of a faculty member toward a Master or Doctoral degree**
- **On-the-job training through hands-on experience such as performing field radiation tests**
- ***Project Based Learning* (PBL) through a space project led by Japanese and foreign students**
- **Lectures on subjects related to space engineering**



III. Career development opportunities

On 25 Jan 2018, Prof. Jordi Puig-Suari (Cal Poly) delivered this lecture: "CubeSats as Workforce Development".

During 2018, Dr Werner Balogh (UNOOSA) gave a 2-credit course called "The Int'l Dimension of Space Activities: Space Law and Policy for Engineers".



In July 2019, Dr Danielle Wood (MIT) taught a short course called "Space Technology for the Sustainable Development Goals".

On 2 Oct 2019, Mr. Kittanart Jusatayanond (CEO of Astroberry, Thailand) discussed his adventures of starting his own space start-up firm and gave career advice to SEIC students.

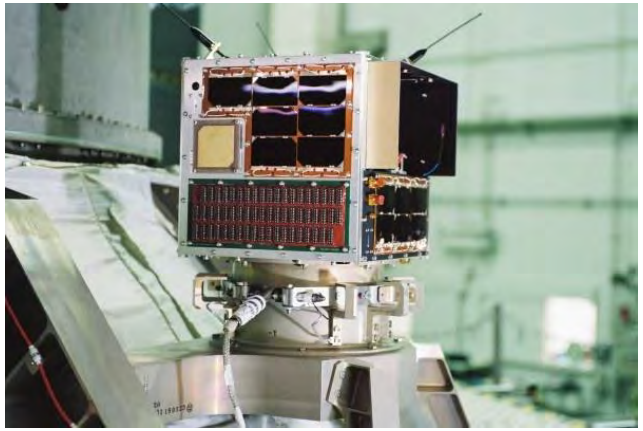
Throughout SEIC, we want you to have a multi-faceted experience. The goal is not just to acquire high tech engineering skills, but also to understand how the contemporary space industry operates in terms of politics, business, space law, space policy, R&D, out-reach, higher education, and so on.

This makes you more attractive to employers inside and outside of the space industry.

IV. Space projects

ABOVE: The HORYU-4 development team (46 staff and students from 18 countries)

BELOW: HORYU-4 flight model



Kyutech always has satellite projects underway – see the next page for a list of our satellites that have been launched. If there is a mutual match, you can get involved.

BIRDS is a special category.
It was designed to help non-space-faring nations get their first satellite into space; so the funding came from those nations.

(BIRDS-1 Project)

The 18 satellites that we have launched so far

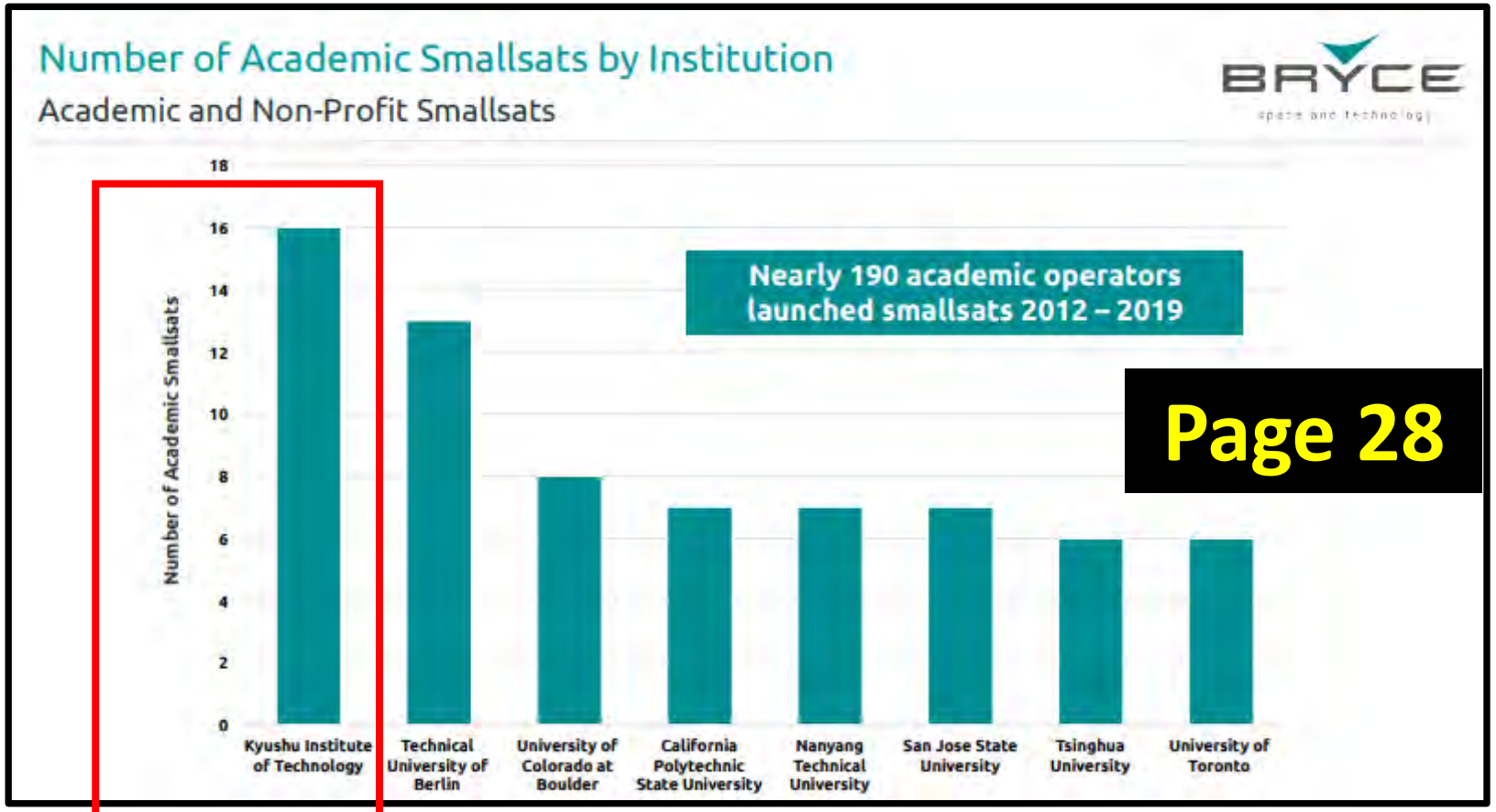
Kyutech Satellite History

G.Maeda, 13 June 2019

No.	Satellite name	(a) Date of Launch (b) ISS deployment	Nations involved	Note
1	HORYU-II	(a) 2012/5/18	Japan	
2	Shinen-2	(a) 2014/12/03	Japan	
3	HORYU-IV	(a) 2016/02/17	Japan	
4	AOBA VELOX-III	(a) 2017/01/19	Japan and Singapore	
5	BIRDS-I : Ghana	(b) 2017/07/07	Japan and Ghana	Ghana's first satellite
6	BIRDS-I : Mongolia	(b) 2017/07/07	Japan and Mongolia	Mongolia's first satellite
7	BIRDS-I : Nigeria	(b) 2017/07/07	Japan and Nigeria	
8	BIRDS-I : Bangladesh	(b) 2017/07/07	Japan and Bangladesh	Bangladesh's first satellite
9	BIRDS-I : Japan	(b) 2017/07/07	Japan	
10	BIRDS-II : Philippines	(b) 2018/08/10	Japan and Philippines	
11	BIRDS-II : Malaysia	(b) 2018/08/10	Japan and Malaysia	
12	BIRDS-II : Bhutan	(b) 2018/08/10	Japan and Bhutan	Bhutan's first satellite
13	SPATIUM-I	(b) 2018/10/06	Japan and Singapore	
14	Ten-koh	(a) 2018/10/29	Japan	
15	AOBA VELOX-IV	(a) 2019/01/18	Japan and Singapore	
16	BIRDS-III : Nepal	(b) 2019/06/17	Japan and Nepal	Nepal's first satellite
17	BIRDS-III : Japan	(b) 2019/06/17	Japan	
18	BIRDS-III : Sri Lanka	(b) 2019/06/17	Japan and Sri Lanka	Sri Lanka's first satellite

https://brycetech.com/reports

If you download the report "Smallsats by the Numbers 2020" produced by **BRYCE SPACE & TECHNOLOGY** (based in Virginia, USA), you will see that they credit Kyutech with the highest number of smallsat launches by any university in the world.



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#1

A major factor behind our high number is the BIRDS Project

These are snapshots of SEIC students doing BIRDS-1 Project (2015-2017)

✓How to sign up

Requisites for joining SEIC

- You must be passionate about space
- You should have a bachelors degree (4- or 5-year type) in some field of engineering
- A physics bachelors degree is also OK if you have a lot of laboratory hardware and software experience
- As SEIC is taught in English, you should be fluent in English (writing, reading, speaking, and listening)

If you are interested in joining SEIC, please send your CV to Professor Mengu Cho or to Assistant Professor George Maeda using these email addresses:

cho@ele.kyutech.ac.jp

maeda@ise.kyutech.ac.jp

Availability of scholarships

AND APPLY EARLY !

- Kyutech has no scholarships to offer – you must secure from other sources
- One to consider is **PNST**, see https://www.unoosa.org/oosa/en/ourwork/psa/bsti/fellowships.html
- Japan Gov't **MEXT** scholarships via your local Japan embassy -- because the application process differs according to the country in which the Japanese embassy is located, please inquire at the Japanese embassy or consulate general in your country for details. List of embassies/consulates: https://www.mofa.go.jp/about/emb_cons/over/
- **JICA** scholarships are available if you live in a developing nation – enquire directly at JICA offices overseas. List of offices: https://www.jica.go.jp/english/countries/index.html

✓How to prepare

2001: A Space Odyssey
(the 1968 movie)

We are definitely looking for a specific kind of engineer.

You must be globally-minded and must have a passion for space.

Also, you must enjoy “hands on” laboratory work.

The Philippines BIRDS-2 Team:
Adrian Salces
and
Joven Javier

You cannot learn how to build satellites by just reading books.

The BIRDS-3 Team doing environmental testing

CEFR=Common European Framework of Reference

SEIC is taught in English. So you must have a strong command of the English language.

To comfortably join SEIC, you should achieve **level B2 or C1 or C2** of the English-language section of CEFR. CEFR is explained here: https://en.wikipedia.org/wiki/Common_European_Framework_of_Reference_for_Languages

Some frequently asked questions

Q1
To enter SEIC, do I need a space or aerospace background?
A1
No, you do not. However, you must have a strong engineering background in any of the standard fields (electrical, mechanical, chemical, civil, etc.). You must have a 4- or 5-year type Bachelor Degree in some field of engineering. SEIC will teach you space engineering.

Q2
To enter SEIC, do I need to know the Japanese language?
A2
No, you do not. However, you are encouraged to learn Japanese culture and language because this opens a large number of doors for you. At SEIC, you should learn more than just space engineering. You should make lots of new friends and contacts – whom you can stay in touch with for the rest of your life. ***continued next column.***

Your extensive human network is just important as technical know-how. "Whom" you know can often be more useful than "What" you know.

Q3
Is my space engineering degree only useful for space engineering?
A3
Emphatically no. We teach more than just space engineering. We teach you "systems engineering", which means you learn *a bigger picture of engineering*.

Bear in mind that a satellite is a system. An automobile is a system. A jet plane is a system. A modern building is a system. A seagoing ship is a system. A high-speed train is a system. A smartphone is a system. A high-tech farm is a system. A military weapon is a system. Medical instruments (CT scanner, MRI scanner, dialysis machine, etc.) are systems. Therefore, when you learn about satellites and other space systems, you …. ***continued next page.***

effectively become a *systems engineer*. You become dramatically attractive to any company, government agency, or university, that needs a *systems engineer.*

Hence, many SEIC graduates go on to work at major manufacturers or other engineering firms. Our graduates are prized for their "broad view of engineering".

Q4

How is space engineering structured at Kyutech?

A4

It is divided into undergrad and post-graduate. The undergrad portion is taught in Japanese and consists of very few foreigners.

SEIC is the post-graduate portion. It is taught in English and the majority of the students are from overseas. Master students must do a lot of course work and also must submit a thesis in order to graduate; he or she is assigned to an academic supervisor. Phd students have very little course work to do but *must conduct original research*. This research must get published, under supervision by a thesis advisor.

Q5

Is getting a student visa difficult?

A5

No. If you work with Kyutech staff for getting into SEIC, you will eventually get your COE (*Certificate of Eligibility*). We will send it to you via snail mail. You take this COE to the nearest Japanese diplomatic mission in your country and the student visa will be stamped into your passport.

Q6

Can I take my family with me?

A6

There are many downsides to studying in graduate school with your family around (both financially and in terms of time management). However, if you really wish your family around then Kyutech does not object.

Q7

Is housing hard to find?

A7

See next page.

Housing: You will get full support from Kyutech to find housing. There is no need to worry. We will help you.

Often, you will have access to on-campus housing in dormitories – which tends to be very inexpensive and very convenient for walking to classes. However, in many cases, you are expected to move off campus (after several months or maybe one year) to make room for new students arriving at Kyutech. Kyutech off-campus housing is not bad. It is significantly cheaper than Tokyo, Osaka, Nagoya, and other well-known Japanese urban areas. For a single-person apartment, you would pay between 300 and 500 US dollar equivalent. Of course, you can easily walk to campus from these apartments.

Q8

Can I buy and drive a car?

A8

Yes, many students have done this. But you will discover that it is easy to live here without a car. It is one of the charms of urban Japan. Public transport is good here.

Q9

How is the climate?

A9

Kitakyushu has four seasons. Spring and fall are fantastically pleasant. Winters are mild – we rarely get snow on the ground. Summer is a problem because August is brutally hot and humid. The terrain is green because we have ample rainfall all year long.

Q10

Are there travel opportunities?

A10

Yes, quite a bit. Seeing Japan is easy because the transportation infrastructure is outstanding: trains, buses, ferries, planes, and so on.

In addition, you are expected to do presentations at academic conferences (and many of these are overseas). By working with your supervisor, funds are available for such trips. Past SEIC students have done a large number of domestic and overseas trips.

Q11

Does Kyutech have good Internet infrastructure?

A11

Yes. All throughout the Tobata Campus, students have access to a high-speed WiFi network. However, off campus you will be on your own. In Japan, many low-cost WiFi service providers are ready to help you get connected – so do not worry.

Q12

What is the dining situation?

A12

Tobata Campus has a popular student cafeteria. During normal academic sessions, it is open for breakfast, lunch, and dinner. The cost of this food is low.

If you prefer to cook at home, it is no issue. Tobata area has several supermarkets. You can get food there, and then cook at home. Most students conduct a mix of using the student cafeteria and cooking at home. The cafeteria is closed on weekends.

Q13

What about health insurance?

A13

You have no choice. You must join the national system, and pay a small fee for it. However, it is comprehensive in terms of medical needs and dental needs. It is a good deal for all foreign students and their families.

Q14

I have heard a lot about the **BIRDS Project**. Where can I learn more about it?

A14

There is a monthly newsletter issued for this project. The newsletter is archived. You have full access to all back issues (since early 2016) of the newsletter here: http://birds1.birds-project.com/newsletter.html

Q15

I love sports. Does Kyutech have good sport facilities?

A15

See the next page.

TOBATA CAMPUS SPORTS FACILITIES

Tobata Campus	
Name of Facilities	Outline of Facilities
Gymnasium	Volleyball - 2 courts, Basketball - 2 courts, Badminton - 6 courts, Handball - 1 courts
Playing Field	400m and 100m track, Soccer - 1 court, Rugby 1 court
Multi-Field	Handball - 1 courts
Budo	Kendo, Judo, Training room
Kyudo	Japanese Archery
Swimming Pool	50m with 7 lanes
Baseball Field	Baseball, Softball
Tennis	10 courts

All kinds of sports are available! (from video)

SEE THE ENTIRE 5-MIN. KYUTECH VIDEO IN ENGLISH: https://www.youtube.com/watch?v=URXGQ5HJZuI

Food

- Supermarkets
  - Many convenience stores
    - Lawson, 7eleven, Mini Stop, Family Mart, Popular, etc…
    - Open 24h/7



Kyushu Institute of Technology
Tobata Campus

18

Foreign Students Orientation
October 2nd 2017

Kyutech is surrounded with convenience コンビニ shops – so you will never go hungry in Japan. And each shop is equipped with an ATM for easy cash withdraw.

← Source:
"New Foreign Students Orientation -- Simple guidance on how to survive in Japan"; page 18;
2 October 2017,
by Dr Pauline Faure

Q16

Is there a student association for foreigners?

A16

Yes: *Kyushu Institute of Technology Foreign Students Association (KITFSA)*

"The Kyushu Institute of Technology Foreign Students Association (KITFSA) was formed to promote better understanding and friendship among its members, Japanese students, Kyutech staff, and local residents through cultural, sports and recreational activities. KITFSA organizes many activities, such as the International Students Festival, sports activities and friendship events among Kyutech campuses. KITFSA is an affiliate organization of the Kitakyushu International Students Association in Tobata, and of Iizuka Friendship Network in Iizuka. You are automatically considered as a member of the KITFSA upon your enrollment to Kyutech."

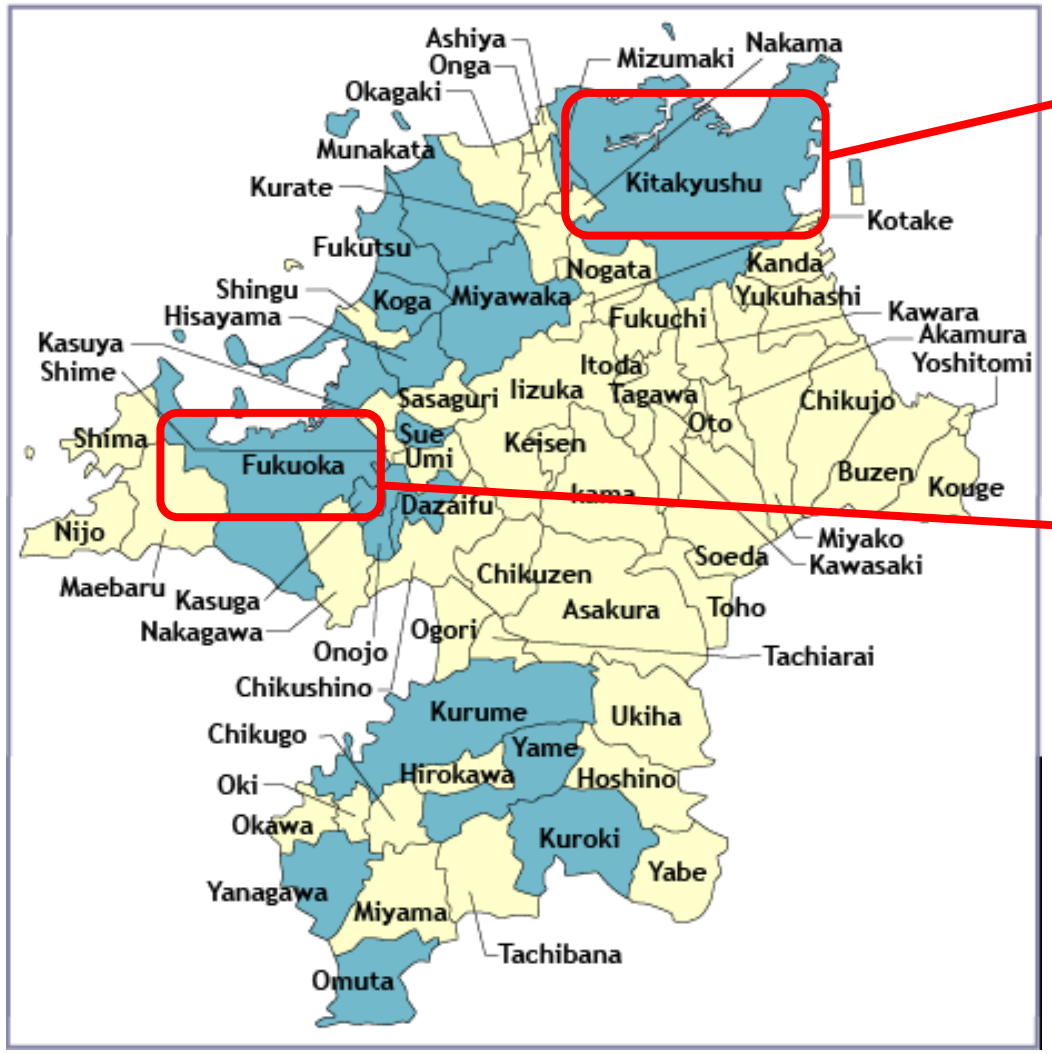
The above passage is from:
https://www.kyutech.ac.jp/english/campuslife/KITFSA.html

Q17

Where is Kyutech?

A17

Kyutech is in the City of Kitakyushu. It is in the northern part of Fukuoka Prefecture – the **red part** below. *More about Fukuoka Prefecture on the next page.*



This is Fukuoka Prefecture

2019 Population: 5.1 million

Kyutech is in Kitakyushu, which is home to about one million persons. It also has Kitakyushu Airport (Code: KKJ) with many domestic routes but only a handful of international routes.

Kitakyushu's slightly bigger brother is Fukuoka City, with a slightly larger population. It has a major international airport (Code: FUK), shown below. It is inside the city.

Hakata Station
It is connected to Kokura, Osaka, Nagoya, Tokyo, etc., via the "Shinkansen" (national high-speed train).

Q18

How does the cost of living in Tokyo compare with Fukuoka area?

A18

One website (Numbeo; 4 May 2020) says the following:

Indices Difference
Consumer Prices in Fukuoka are 8.34% **higher** than in Tokyo
Consumer Prices Including Rent in Fukuoka are 9.14% **lower** than in Tokyo
Rent Prices in Fukuoka are 48.85% **lower** than in Tokyo
Restaurant Prices in Fukuoka are 12.49% **lower** than in Tokyo
Groceries Prices in Fukuoka are 27.10% **higher** than in Tokyo
Local Purchasing Power in Fukuoka is 11.25% **lower** than in Tokyo

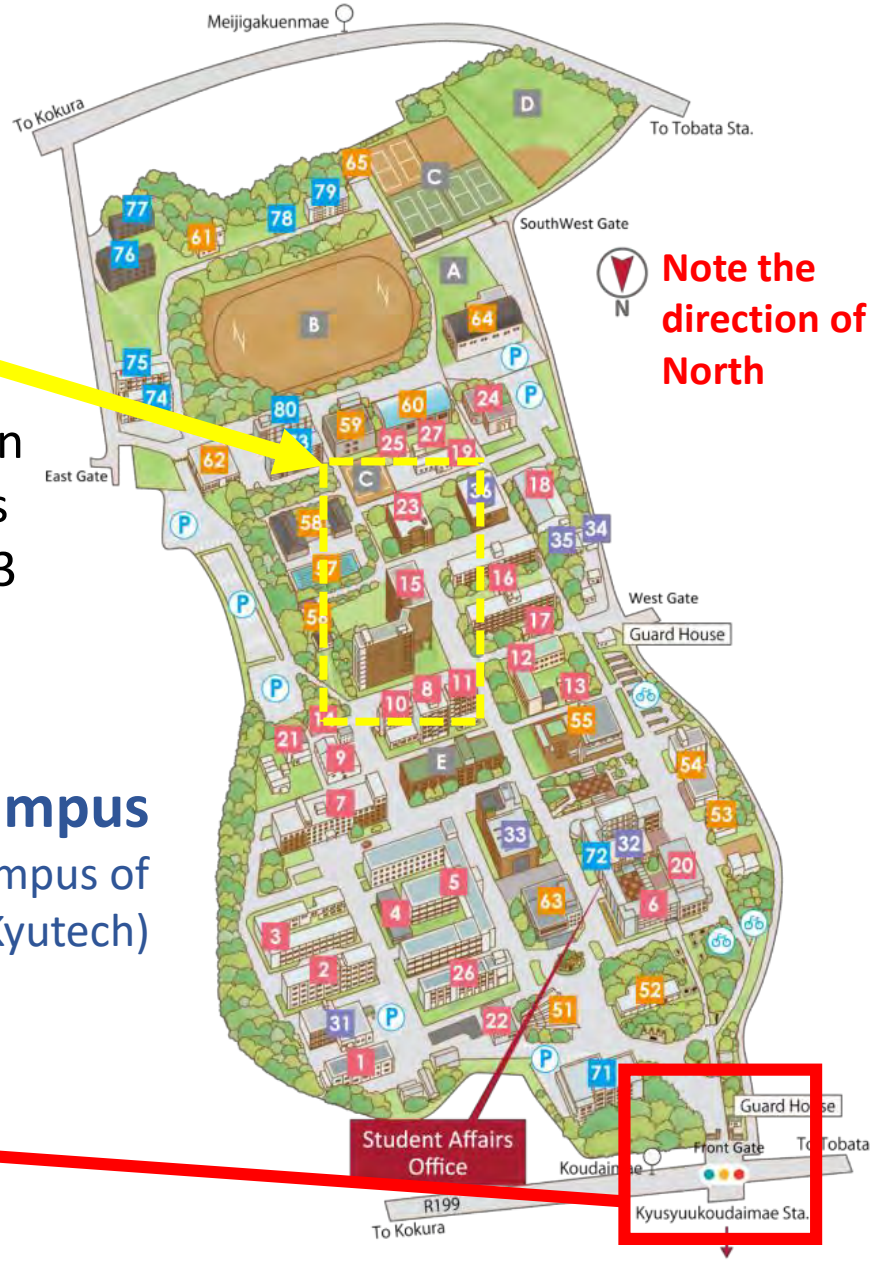
https://www.numbeo.com/cost-of-living/compare_cities.jsp?country1=Japan&city1=Tokyo&country2=Japan&city2=Fukuoka

So rent is much lower in the Fukuoka area than Tokyo.

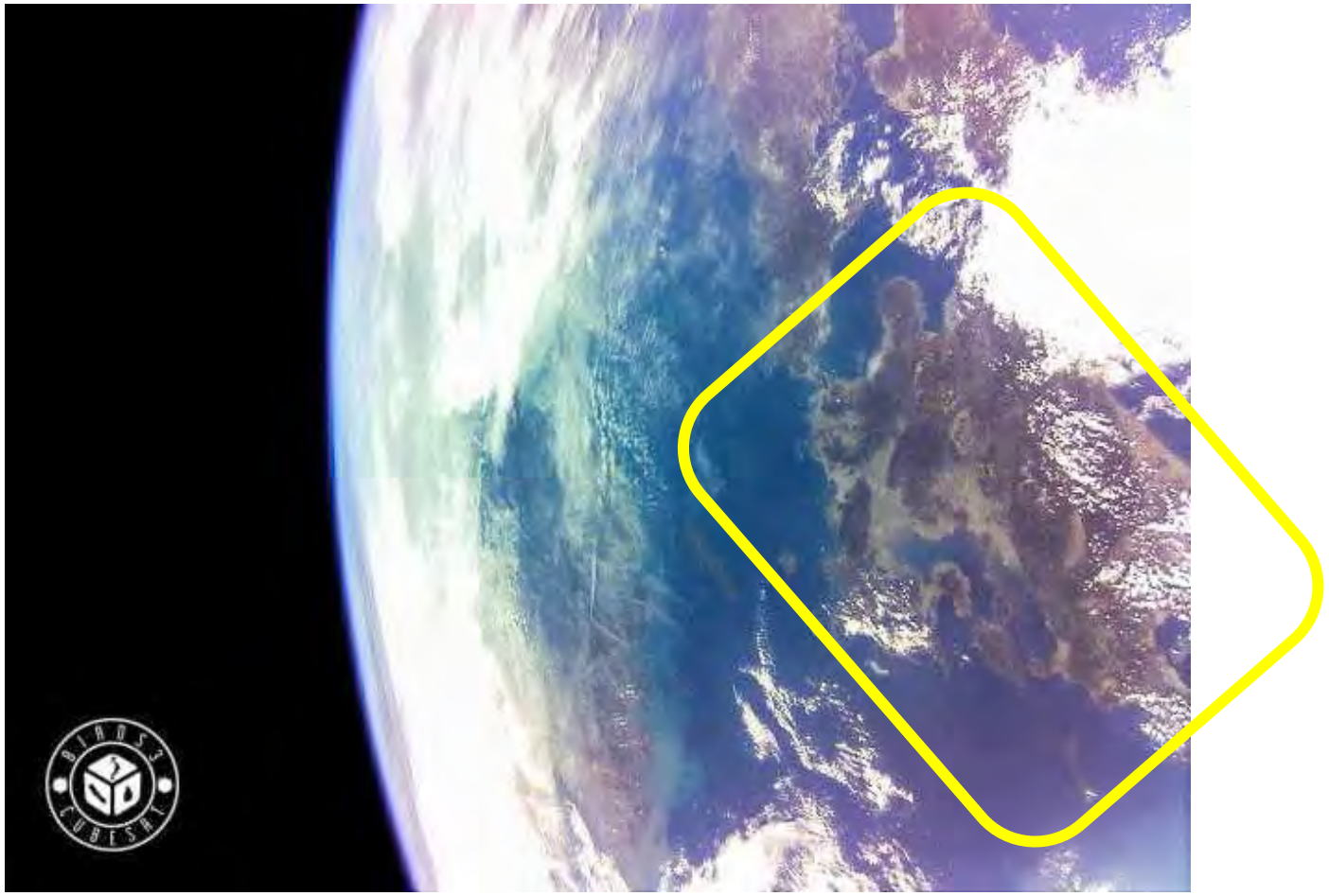
Main entrance of Kyutech

SEIC
is based in Buildings 15 and 23

Note the direction of North



Tobata Campus
(the main campus of Kyutech)



A view of Kyushu taken by BIRDS-3

Q19

Is there anything special about Kyushu?

A19

Yes. It is not as famous as Tokyo or Kyoto, but it has a lot to offer. One reason: Kyushu has contributed immensely to 2000 years of Japan's history. I hope you will find time to explore Kyushu while you are here.

Link for a 29-page visual tour of Kyushu:

https://birds3.birds-project.com/wp-content/uploads/2018/12/Kyushu_for_SEIC.pdf

Q20

Before entering SEIC, should I prepare a laptop computer?

A20

Yes, before going to Japan or soon after arriving here, you need to purchase your own laptop computer.

In the table at the right, you can see the Kyutech BYOD specs for “minimum case” and “recommended case”. As a SEIC student you should only consider the “recommended case.”

You will be able to receive **Microsoft Office** (Word, Excel, PowerPoint, etc.) from Kyutech for free (under license) once you are enrolled as a student here at Kyutech.

If possible, purchase **Adobe Acrobat** because you will need to create many pdf documents during your time at Kyutech. This software is not provided by Kyutech.

Kyutech BYOD (Buy Your Own Device) Requirements 28 April 2020 [translated from Japanese document by G.Maeda]		
	Minimum Specification	Recommended Specification
Operating System	Windows 10 Home/Pro (or better), or macOS Mojave [10.14] (or better)	
CPU	ntel Core i5	Intel Core i7, or better
Main memory	4 GB	8 GB
Hard disk memory	200 GB	SSD 200 GB
Display resolution	1366 x 768	1920 x 1080
Network connection	Wireless LAN: IEEE 802.11n compatibility (external unit is OK, too)	
External interface	* USB 2.0 or higher * VGA video output (using HDMI and USB Type-C adaptors are OK)	
Battery capacity	3 hours	6 hours or more

We conclude with comments from some SEIC alumni

All comments were written in June of 2020

This has been one of the best experiences of my life because I have had the opportunity to participate in all the phases from a satellite development project. I have worked in an international environment with not only Japanese students but students from different countries under the supervision of professor and staff with a lot of experience.

In addition, I have enjoyed Japanese food, culture, places, and friendship of the Kyutech community.

Jesus Gonzalez-Llorente, Phd
(Colombia)
Professor,
Electronics Engineering

Universidad Sergio Arboleda
Bogotá, Colombia

SEIC is a really effective and intensive graduate-level course. Not only curriculum is exciting but also environment, engagement, projects, students, visitors, seminars, etc., everything is well fit. At Kyutech, you can touch everything. You can be part of everything. SEIC is preparing large portion of future space leaders. We can see in near future, many young space leaders from many different countries would be SEIC alumni.

T. Turtogtokh, Phd
(Mongolia)
Lecturer
National Univ. of Mongolia
Mongolia

SEIC is a unique, all-inclusive and comprehensive space engineering course which is incomparable to any kind of studies elsewhere. The course contents are very relevant to learn about space technologies, from mission design to its implementation and other space-related subjects. The faculty members are highly educated and experienced in the field. The best part of SEIC is its diversity and the learnings that take place outside the classroom.

SEIC students come from countries all over the world with different backgrounds and knowledge. Kyutech invites professors from MIT, UN, Calpoly, and also astronauts who have undertaken expeditions to space, to interact with SEIC students. As a part of the course, I was involved in Bhutan's first satellite project as BIRDS-2 member and also be a part of BIRDS-3 project designing and developing the first satellites of Nepal and Sri Lanka. I could get hands-on training in building CubeSats, and I could learn so much more by doing it actually. These make SEIC a completely inductive learning environment.

Pooja Lepcha
(Bhutan)
Phd candidate,
LaSEINE, Kyutech

I joined SEIC program for my master and doctoral degree from 2014. This program offers a very good environment for research focusing on space technology. I also got the chance to be involved in two satellite projects there, which allowed me to gain broader knowledge through hands-on experience.

As a student, I had access to do the experiment using high-spec laboratory facilities, such as space environment chambers (thermal vacuum chamber, vibration machine, etc.).

Even though this program is conducted by Kyutech, Japan, the courses are taught in English. I encourage anyone from any nationality who is eager to seek experience and knowledge related to space science and technology to consider entering SEIC.

Rahmi Rahmatillah
(Indonesia)
Lecturer
Institut Teknologi Sumatera
Lampung, Sumatera
Indonesia

My 3 years' doctoral degree experience in SEIC was amazing. I was assigned to the research laboratory called LaSEINE which offers me a multicultural environment and during the first two years, I have the opportunity to involve in the BIRDS-2 Project. I never have any background experience in the Aerospace Engineering or Space Engineering, but in SEIC, I learned Space Engineering and Satellite Development theoretically and practically.

I was lucky to have the opportunity to implement all my understanding and knowledge in the real satellite project. Because of this, I develop my passion for space and satellite particularly, and desire to apply my skills and the technology I acquired in Malaysia.

Syazana Basyirah
(Malaysia)
Centre of Satellite Communication;
UiTM, Malaysia

I will never take the experience of being able to design, manufacture, test and operate real satellites for granted. During my five years graduate program at Kyutech, I was able to complete two satellite projects.

It was a complete engineering training that afford students a unique design-thinking opportunities propelled by a unique global collaborative environment and supported by the best group of faculty drawn from academic and top space industry.

Tejumola Taiwo, PhD
(Nigeria)
MSc, PhD (Space Systems Engineering, Kyushu Institute of Technology)
Now: Assistant Professor, International Space University, France.

Raihana Shams Islam Antara
(Bangladesh)
Lecturer
BRAC University
Bangladesh

From childhood, I have a passion for space engineering. I came to know about SEIC and its lab facilities in the year of 2014. So, I applied for my M.Sc. and got selected for the program. I was so happy to be a part of this as in Bangladesh there was no opportunity in space education. From the first day at SEIC, my life started changing. For me, this was more than my MSc. Degree, because this gave my country Bangladesh, the first satellite BRAC *Onnesha* which was developed under the BIRDS-1 Project and I am extremely proud to be a part of BRAC *Onnesha.*

SEIC is a multidisciplinary and multicultural department. I gather knowledge from space system engineering to space law and also, the more valuable are the people whom I got to come in contact with. I made friends from around the world which is helping me also in my professional life.

← Deployment of BIRDS-3 satellites (Nepal, Japan, and Sri Lanka) from the ISS on 17 June 2019. This is a 3-min. *YouTube* video – just click on the link below.

The End

https://www.youtube.com/watch?v=4NdTc1dEa6c