This *English translation* is provided for the *information purpose only*.

Application Guidelines for Master's Program in Biomedical Science and Engineering

Special Selection for International Applicants

October 2020 Enrollment

Graduate School of Biomedical Science and Engineering,
Hokkaido University

Objectives of Education and Admission Policy

The Graduate School of Biomedical Science and Engineering is a graduate school designed for education and research in “the biomedical science and engineering field”: an interdisciplinary new academic field aimed at applying advanced science and engineering to the medical field under the four basic philosophies of Hokkaido University (Frontier Spirit, Global Perspectives, All-round Education and Practical Learning).

The goal of education at this graduate school is to cultivate individuals possessing the following capabilities/features:

- Individuals possessing advanced expertise, broad perspectives and a strong sense of ethics capable of contributing to the sustainable development of society;
- Individuals possessing outstanding knowledge and high research abilities capable of meeting the demands of sophistication and globalization of various issues related to medical technology, medical device development and so on.

To achieve these educational goals, this graduate school provides two courses:

- “Quantum Biomedical Science and Engineering Course” aimed at learning application of radiation physics (developing from quantum mechanics) to medicine;
- “Molecular Biomedical Science and Engineering Course” aimed at learning utilization of science of engineering (related to dynamics of bio molecular particles) to medicine.

Through either course, this graduate school will provide integrated education systematically to help students acquire basic knowledge/skills in the fields of science and engineering as well as basic knowledge/sense of medicine and medical ethics in a manner not restricted with any existing framework. For embodiment of this plan, this graduate school seeks students: having strong interest and high spirit of inquiry in “biomedical science and engineering” and its fundamental fields (science, engineering and medicine), having basic academic ability needed for further learning in these fields, and willing to engage in research earnestly making use of acquired knowledge/skills towards the goal of contributing as a specialist in biomedical science and engineering to the sustainable development of society.

To select such students from among diverse talents in Japan and overseas, we will conduct the following examinations, primarily on individuals having completed the undergraduate course of scientific fields (science, engineering, health science, dentistry, pharmaceutical science, veterinary medicine, etc.) and those engaged in jobs related to biomedical science and engineering at medical facilities, enterprises or the like after completion of the undergraduate course.

- External English proficiency test (submission of the score sheet)
  Evaluation of the capability of foreign language
- Writing a paper on a given topic
  Evaluation of the capability of scientific thinking, discussion, etc.
- Oral examination
  Evaluation of self-motivation for research, scientific thinking capability, research capabilities, personality and so on

Application Guidelines to Master's Program
Special Selection for International Applicants
(For enrollment October 2020)

1. Major and Number of Students Admitted

Biomedical Science and Engineering: a few students

2. Qualifications of Applicants

Those who cannot arrive in Japan during the date of examination designated by Graduate School of Biomedical Science and Engineering, Hokkaido University and those who can obtain consent from the prospective supervisor prior to application. Applicants must satisfy either of the following requirements:

(1) Those who have completed or are expected to complete 16 years of formal education overseas by September 2020.

(2) Those who have been awarded or are expected to be awarded by September 2020 a degree equivalent to Bachelor's degree from an overseas university or an overseas educational institution (limited to the one which overall situation such as educational and research activities has been evaluated by the said foreign country's government or the agency accredited by related organization or the one which is specifically designated as equivalent to above by the Minister of Education, Culture, Sports, Science and Technology) by completing three or more years of curriculum (including completing the said curriculum by an overseas educational institution by way of distance education while residing in Japan or completing the curriculum at an educational institution which is specifically designated by the Minister of Education, Culture, Sports, Science and Technology).

(3) Those who are not fallen under (2) and have completed 15 years of formal education overseas, and are deemed eligible to apply by Graduate School of Biomedical Science and Engineering, Hokkaido University. (See Note)

(4) Those who are deemed by Graduate School of Biomedical Science and Engineering, Hokkaido University under individual qualification review to have academic ability equal to or greater than university graduates, and will be 22 years of age or older by 30 September 2020. (See Note)

Note: Those who apply under Qualifications of Applicants (3) or (4), must undergo qualification review. Refer to 3. (6) Qualification Review for further information.
Qualification review described in Qualifications of Applicants (4) is the process to examine research history and work experience of those who do not have university diploma.

3. Application Procedure

(1) How to Apply

Applicants have to access the website designated by the prospective supervisor. The website will be notified to only applicants who can obtain consent from the prospective supervisor. Applicants have to send the original application documents listed in the following (3) Application Documents 1-7 to Student Affairs Office by post.

(2) Application Period

Online Registration:

From 9:00 (Japan Standard Time), Wednesday, 10 June 2020 to 17:00 (Japan Standard Time), Friday, 12 June 2020

Submission Deadline of Application Documents: 17:00 (Japan Standard Time), Monday, 22 June 2020

Original application documents must arrive at Student Affairs Office by post.

(3) Application Documents

1	Application Form and Curriculum Vitae	Access the website and fill in your information. Print them out on A4 size paper. (210mm x 297mm)
2	Photo ID Card	Access the website, fill in your information, and print it out on A4 size paper. Paste your photograph (full-face, applicant's name printed on the back, 4cm x 3cm) taken within 3 months before (2) Submission Deadline of Application Documents in the space provided.
3	Academic Transcripts	Must be issued by the university or college.
4	Statement of Purpose	Download from the website. Explain the following 3 points in English (800 words.): 1. Past Research Activities, 2. The motive for the application and 3. Future Goals.
5	Certificate of (expected) Graduation or Completion	Must be issued by a university/college president or Dean. (For graduates, be sure that the certificate includes information on your degree). *Those who graduated or will graduate from a university in China (excluding Taiwan, Hong Kong and Macau) must submit the following documents in addition to a Certificate of (Expected) Graduation (Completion) . Graduates: a. Online Verification Report of Higher Education Qualification Certificate（教育 b. Certified copies of your Graduation Diploma（毕业证书）and Degree Diploma（学位证书）that has been authorized by your university/college 部学历证书电子注册备案表） Expected Graduates : a. Online Verification Report of Student Record（教育部学籍在线验证报告） Obtain documents "a" above by requesting it at "中国高等教育学历证书查询": http://www.chsi.com.cn/xlcx/bgys.jsp. Also be sure that there are 15 or more days left until the expiration date of the online verification at the time of its submission.
6	Proof of English Language Skills	If English is not your first language: Copies of the following test results as proof of English language proficiency taken within 2 years before the deadline of application. (e.g. TOEFL-PBT, TOEFL-iBT, TOEIC Listening & Reading Test, IELTS) If you only have a score sheet other than the above, contact the Student Affairs Office promptly as there are cases in which such a document may be accepted.
7	Copy of Passport	The page which your photo and passport number are shown.
8	(If applicable) Consent to Transfer and Process Personal Data	Applicants from EEA must confirm the Handling of Personal Information on page 6-7 and submit their consent. The form will be sent by the prospective supervisor via e-mail.

Other documents may be designated by Graduate School of Biomedical Science and Engineering, Hokkaido University and required to submit later as needed.

(4) Payment of Examination Fee

Follow the on-screen instructions after completing website registration, and pay the examination fee (JPY 30,000) by credit cards or Pay-easy. Please note that applicants have to pay transaction fee (JPY 500) besides examination fee (JPY 30,000).

Payment of examination fee is not required for applicants who wish to enroll on a Japanese Government (Monbukagakusho: MEXT) Scholarship, a Chinese Government (China Scholarship Council: CSC) Scholarship, or a Hokkaido University President's Fellowship.

Those who apply under 2. Qualifications of Applicants (3) or (4), must pay the examination fee after

qualification review.

Examination fee is non-refundable unless:

1) The application was not made.
2) Application documents were not accepted due to the documents being incomplete.
3) Double-payments were made.

Please acknowledge that it takes considerable time for processing refund.

Please keep the receipt, as it is required when claiming the refund to Student Affairs Office.

(5) Important Notice

1) Online registration, payment of examination fee, and submission of application documents by post must be completed by (2) Submission Deadline of Application Documents.

2) Printers and email address are required for online registration.

3) Application documents submitted will not be returned.

4) Application documents should be sent to Student Affairs Office by safe and reliable methods such as Express Mail Service (EMS). Late arrival due to postal accident will not be accepted.

(6) Qualification Review

Those who apply under 2. Qualifications of Applicants (3) or (4), must undergo individual qualification review. Applicants have to contact the prospective supervisor by email. Applicants have to send the original 2) Application Documents for Qualification Review 1-7 to Student Affairs Office by post.

1) Application Period for Qualification Review

Submission Deadline of Application Documents for Qualification Review:

17:00 (Japan Standard Time), Friday, 22 May 2020

Original application documents for qualification review must arrive at Student Affairs Office by post.

2) Application Documents for Qualification Review

1	Application Form for Qualification Review	Sent by the prospective supervisor by email. Fill in your information. Print them out on A4 size paper. Paste your photograph in the space provided. (Full-face, applicant's name printed on back, 4cm x 3cm, taken within 3 months before 1) Submission Deadline of Application Documents for Qualification Review.)
2	Academic Transcripts	Must be issued by the university or college.
3	Certificate of (expected) Graduation or Completion	Must be issued by a university/college president or Dean. (For graduates, be sure that the certificate includes information on your degree). *Those who graduated or will graduate from a university in China (excluding Taiwan, Hong Kong and Macau) must submit the following documents in addition to a Certificate of (Expected) Graduation (Completion) . Graduates: a. Online Verification Report of Higher Education Qualification Certificate（教育部学历证书电子注册备案表） b. Certified copies of your Graduation Diploma（毕业证书）and Degree Diploma（学位证书）that has been authorized by your university/college Expected Graduates : a. Online Verification Report of Student Record（教育部学籍在线验证报告） Obtain documents "a" above by requesting it at "中国高等教育学历证书查询": http://www.chsi.com.cn/xlcx/bgys.jsp. Also be sure that there are 15 or more days left until the expiration date of the online verification at the time of its submission.
4	Copy of Passport	The page which your photo and passport number are shown.
5	Proof of English Language Skills	If English is not your first language: Copies of the following test results as proof of English language proficiency taken within 2 years before the deadline of application. (e.g. TOEFL-PBT, TOEFL-iBT, TOEIC Listening & Reading Test, IELTS) If you only have a score sheet other than the above, contact the Student Affairs Office promptly as there are cases in which such a document may be accepted.
6	(If applicable) Consent to Transfer and Process Personal Data	Applicants from EEA must confirm the Handling of Personal Information on page 6-7 and submit their consent. The form will be sent by the prospective supervisor via e-mail.
7	Others	i) Certificate of research experience issued by the enrolled university or research institute. ii) Letter of Recommendation issued by supervisors or mentors of the enrolled university or research institute. (Free format.) iii) Certificates of academic ability equivalent to or greater than university graduates, or statement of academic achievements. (Such as scientific papers, books, and reports.) iv) Other documents may be designated by the prospective supervisor as needed.

3) Announcement of Results for Qualification Review

Results for qualification review will be notified to applicants by email by Monday, 8 June 2020.

After qualification review, eligible applicants have to see (1) How to Apply, and do necessary procedures. Applicants have to send the original (3) 1) Application Form and Curriculum Vitae, 2) Photo ID Card, and 4) Statement of Purpose to Student Affairs Office by post.

(7) Application Documents should be submitted to:

Student Affairs Office,
Graduate School of Biomedical Science and Engineering, Hokkaido University
Kita 15 Nishi 7, Kita-Ku, Sapporo, 060-8638 JAPAN
Phone: +81-(0)11-706-5523
Email: d-tanto@med.hokudai.ac.jp

4. Selection Procedure

Admission shall be determined individually based on the comprehensive evaluation of internet video interview (skype interview), and application documents submitted. Applicants must prepare equipment such as a web camera and the proper network environment for internet video interview **by 5. Examination Date and Time**.

5. Examination Date and Time

Designated date between Tuesday, 30 June 2020, and Monday, 6 July 2020. Detailed examination date and time will be notified to applicants by the prospective supervisor by email.

6. Announcement of Acceptance

A Letter of Acceptance will be sent to each successful applicant by email at 10:00 (Japan Standard Time) on Friday, 17 July 2020. And the original letter of acceptance will also be sent by post. Any inquiry by telephone or other source concerning examination result will not be accepted.

7. Enrollment Procedure

(1) Registration Period

From 9:00 (Japan Standard Time), Wednesday, 9 September 2020 to 17:00 (Japan Standard Time), Tuesday, 15 September 2020, on weekdays

(2) Enrollment and Tuition Fees

1) Enrollment Fee: JPY 282,000 (estimate)
Please note that it is not required for those who is granted a Japanese Government (Monbukagakusho: MEXT) Scholarship, a Chinese Government (China Scholarship Council: CSC) Scholarship, or a Hokkaido University President's Fellowship.

2) Tuition Fee: JPY 267,900 per half year (JPY 535,800 per year) (estimate)
Tuition of the first period should be paid using the bank remittance form sent from Hokkaido University Graduate School of Biomedical Science and Engineering in middle of November 2020.
If the fee is revised, the new one will be adapted accordingly.

Payments of enrollment and tuition fees could be exempted or postponed. Further information will be included in the notification of enrollment procedure.

8. Important Notice

(1) Before filling in a column of the preferred field on the application for enrollment in 3. (3) 1) Application Form and Curriculum Vitae, refer to "Organization and main research contents at Graduate School of Biomedical Science and Engineering" and the following URL https://www.med.hokudai.ac.jp/en/bme/laboratory-nav/index.html and consult your prospective supervisor about research contents and plan.
(2) Incomplete application documents and/or lack of documents will not be processed.
(3) Submitted documents are considered final and revision after submission will not be accepted.
(4) Enrollment may be cancelled at any time, should submitted documents be found to contain false information.
(5) Application documents must arrive at Student Affairs Office by post. Consider postal service situation and send early enough to be arrived. Late arrival after 3. (2) Submission Deadline of Application Documents will not be accepted.
(6) Any inquiry regarding examination and enrollment should be sent by email.

9. Use of Personal Information

(1) All personal information collected by Hokkaido University will be completely protected in compliance with the

Act on the Protection of Personal Information Held by Independent Administrative Agencies, and the EU General Data Protection Regulation (GDPR) pursuant to the Hokkaido University Regulations on Personal Information Management.

(2) Your name, address, and other personal information you provide to the university through application and individual admissions screening processes will be used solely for ① enrollee selection (application processing and the screening process), ② the announcement of exam results, ③ admission procedures, ④ surveys and research on enrollee selection methods, and ⑤ other related processes.

(3) The personal information in section (2) above will also be used after enrollment, only for those who pass the exam, for processes related to ① academic affairs (registration, academic guidance), ② student support services (health management, scholarship applications, dorm admission selection, welfare services, etc.), ③ job search support services, ④ tuition, ⑤ use of the university library, ⑥ use of information education facilities, ⑦ confirming your safety and communication in a disaster or emergency situation, and ⑧ public relations (distributing newsletters, information on events, etc.).

(4) Personal information contained in exam results will be used to conduct surveys and research on enrollee selection methods.

(5) For recruiting purposes, when we receive a request for information from the Hokkaido University Frontier Foundation (Kita 8 Nishi 5, Kita-ku, Sapporo, Hokkaido; Tel: +81-(0)11-706-2017) or Hokkaido University Athletic Union (Kita 17, Nishi 7, Kita-ku, Sapporo, Hokkaido; Tel: +81-(0)11-716-4815), the only personal information listed in section (2) will be provided for use within the scope of that organization’s activities.

(6) The personal information set forth in (2) will be retained for five years from the next academic year of our acquirement.

(7) The university shall use Article 6, Paragraph 1 (a) of the EU GDPR as the basis for handling personal information and obtaining consent to use it. Personal information will only be used for the purpose for which consent has been given, except when required by laws and regulations.

(8) The consent set forth in (7) may be revoked at any time. However, this does not affect the legal handling of personal information before consent was revoked.

(9) Individuals who provide personal information may make the following requests to the university based on the EU GDPR and related laws and regulations:

① Disclosure of personal information, ② Correction of personal information, ③ Erasure of personal information, ④ Limitation of the handling of personal information, ⑤ Objection to the handling of personal information, ⑥ Transfer of personal information to other service providers

(10) If you have provided personal information within the European Economic Area, you may file an objection to a supervisory authority in accordance with Article 51, Paragraph 1 of the EU GDPR if you are dissatisfied with the university’s handling of your personal information, etc.

(11) Some of the processes in (2)－(5) mentioned above may be outsourced by the university to a contracted service provider (hereinafter referred to as “contractor”). All or some of the personal information provided by applicants may be provided to the contractor only as needed to perform the tasks for which it has been contracted.

(12) This university is subject to Japan’s Law for the Protection of Personal Information Retained by Independent Administrative Institutions, but not subject to adequacy decisions by the European Commission.

May 2020

Student Affairs Office,
Graduate School of Biomedical Science and Engineering, Hokkaido University
Kita 15 Nishi 7, Kita-Ku, Sapporo, 060-8638, JAPAN
Phone: +81-(0)11-706-5523

Organization and main research contents at Graduate School of Biomedical Science and Engineering, Hokkaido University

Quantum Biomedical Science and Engineering Course

Department: Particle Beams for Biomedical Science and Engineering		
1	Laboratory	**Radiation Oncology**
	Instructor	SHIRATO Hiroki, Professor SHIMIZU Shinichi, Professor NISHIOKA Kentaro, Assistant Professor
	Outline	Radiotherapy can be characterized by the possibility of preserving the function originally possessed by the living body and maintaining the function of individual patients through induction of disappearance of neoplasm/tumor, unlike surgical treatment which treats cancer by removing organs/tissues out of the body. Radiotherapy with X-ray and particle beam therapy with charged particles achieve treatment through utilization of the physical characteristics of these rays in medicine by means of scientific/engineering technology. Development of more practically useful and effective devices and therapeutic techniques will be enabled if we view and discuss the frontier technology of engineering and science on the basis of deep understanding of human body structure/function and medical/physiological viewpoints, focusing for example on dose concentration for the purpose of tumor control, dose reduction to normal tissues/organs to minimize adverse reactions and dealing with body and organ movements that always change their location under the influence of respiration, cardiac beating, peristalsis, etc. This laboratory is aimed at cultivating talents capable of contributing to improvement in disease curing rate and QOL (quality of life) of patients with cancer and other diseases through research on technology dealing with motion of organs during radiotherapy, research on particle beam therapy and development of new medical technology, as well as cultivating globally active researchers and educators on these topics.
2	Laboratory	**Radiation Medical Physics**
	Instructor	TAKAO Seishin, Assistant Professor
	Outline	Following recent improvement in the outcome of treatment thanks to advances in medical/scientific/engineering technology, the need to radiotherapy has been increasing remarkably. Among others, particle beam therapy, which applies accelerators to healthcare, is receiving much expectation as a means of minimizing the patient's physical stress through achieving dose concentration on the target cancer. Recently, the use of image guiding technology has made it possible to provide treatment in a way tailored to the patient's motions during treatment, morphological changes of the tumor, bioreactions and other factors. This laboratory is aimed at utilization of the technology of science/engineering (radiation physics, quantum beam applied engineering, image engineering, etc.) to healthcare. Specifically, in collaboration with the Hokkaido University Hospital Proton Beam Therapy Center, this laboratory will engage in development of irradiation technology/devices capable of reducing adverse reactions and improving therapeutic efficacy, development of image guiding technology incorporating detailed information about patient's motions and tumor's morphological changes, development of dose calculation/optimization techniques for realization of high precision treatment, and comprehensive education/research through links of medicine, science and engineering (verification of therapeutic efficacy, taking into account also the cellular level reactions, etc.). Through these activities, this laboratory will cultivate researchers of medical physics and engineers for medical device development.
Department: Radiation for Biomedical Science and Engineering		
3	Laboratory	**Medical Applied Basic Physics**
	Instructor	AIKAWA Masayuki, Professor
	Outline	In medical fields, such as radiation therapy and particle therapy, a basic understanding of natural science, especially physics, can play an important role to solve problems and develop new technologies. For example, it is necessary to investigate probabilities (cross sections) of nuclear reactions systematically to accurately estimate the necessary amount of radioactive isotopes (RI) for medical care while minimizing unnecessary by-products. We focus particularly on charged-particle induced reactions, and experimentally measure production cross sections of the RI for medical use. In this manner, we train specialists to obtain new knowledge for medical care from the viewpoints of basic physics.
4	Laboratory	**Medical Physics and Engineering**
	Instructor	ISHIKAWA Masayori, Professor
	Outline	Although medical physics is an indispensable element for radiotherapy, it seems to be less mature in Japan than in other countries. In the United States, leading the world in terms of radiotherapy, each facility providing radiotherapy has medical physicists, who is in charge of quality control of radiotherapy and development of new radiotherapy techniques. In Japan, there is no sufficient environment for such active roles of medical physicists. Radiation measurement is a core technology not only for radiotherapy, but also diagnostic radiology and nuclear medicine. Expertise education on these topics is an element indispensable for cultivation of researchers in

		the field of medical physics and engineers engaged in development of radiotherapy devices. This laboratory will cultivate researchers and engineers capable of contributing to healthcare through development of clinically useful technologies, in collaboration with the Hokkaido University Hospital.
5	Laboratory	**Clinical Medical Physics**
	Instructor	HASHIMOTO Takayuki, Associate Professor SUZUKI Ryusuke, Assistant Professor TAMURA Masaya, Assistant Professor
	Outline	New discovery for the next generation can be achieved if problems with clinical practice are viewed as research seeds and attempts are made to find solution to such problems through utilization of the knowledge/skills of science and engineering while adhering to the medical ethics. To this end, students will carry out research in areas closer to a hospital, and check the ideas arising from such research through experiments, simulation, etc. at our laboratory, followed by translational research in collaboration with the industry, towards the goal of acquiring research capabilities leading to development of medical devices. In this laboratory, optimization of treatment planning for radiation therapy, development of database to manage whole information of treatment planning and other topics will be conducted as educational and research activities. In addition, development of novel technique and algorithm for real-time image guided radiation therapy will also be conducted. During the course of such activities, students acquire the capabilities needed for medical physicists. In this way, talents capable of contributing to the society will be cultivated.

Molecular Biomedical Science and Engineering Course

Department: Biomedical Imaging		
6	Laboratory	**Medical Image Analysis**
	Instructor	KATOH Chietsugu, Professor
	Outline	This laboratory involves research on computerized processing of images yielded from nuclear medicine tests (PET, SPECT (Single Photon Emission Computed Tomography)), CT, MRI and so on aimed at precisely collecting medical information from such visual data. Regarding tumor images, research is made on estimation of tumor malignancy and volume, estimation of the periphery of lesions, estimation of appropriate range of irradiation, correction of artifacts on images arising from respiratory motions and cardiac beats, and so on. Regarding images of myocardium and brain, compartment model analysis is carried out on serial dynamic images following a dose of contrast material or radioisotope for the purpose of quantitative evaluation of ischemic lesions and quantitative analysis of tissue blood flow, oxygen consumption, etc. New technique is under studying using Artificial Intelligence (AI) with Deep Learning for analyses of medical image data. Talents capable of developing programs for achievement of these goals will be cultivated.
7	Laboratory	**Integrated Molecular Imaging**
	Instructor	KUGE Yuji, Professor HIRATA Yuichi, Associate Professor MIZUNO Yuki, Assistant Professor
	Outline	For realization of diagnostic molecular imaging, it is indispensable to develop a probe (molecular probe) for conversion of molecular information of the living body into measurable signals. This laboratory is aimed at developing clinically applicable molecular imaging technology through research of new molecular probes, i.e., through exploration of functional molecules, designing of probes, development of probe synthesis technology and synthesis devices, and translational research using experimental disease models for clinical application. In addition, through these research and development activities, this unit will guide students to acquire necessary knowledge/skill systematically so that they can contribute to healthcare and society.
8	Laboratory	**Biomarker Imaging Science**
	Instructor	THA Khin Khin, Associate Professor Kenneth Lee Sutherland, Assistant Professor
	Outline	In recent years, close attention has been paid to tailored medical care technology through molecule-targeted treatment and pin-point irradiation of proton beam, etc. Noninvasive or least-invasive imaging modalities such as MRI and CT have been extensively used for selection of treatment methods, treatment planning and prediction/assessment of responses to treatment. This laboratory is aimed at utilization of latest MRI and CT techniques for development of image diagnosis techniques with high resolution and precision, imaging methods enabling detection of early subtle changes of the living body conventionally difficult to find, noninvasive or least-invasive imaging techniques reflecting not only morphological information but also information on physiological changes of living body at cellular/molecular level and frontier high precision and noninvasive or least-invasive image diagnosis technology with little burden on patients. Education and research on normal radiologic anatomy making use of these imaging techniques will also be provided.

Department: Biology for Biomedical Science and Engineering		
9	Laboratory	**Molecular Oncology**
	Instructor	HIGASHINO Fumihiro, Associate Professor
	Outline	Correct understanding of the mechanism for carcinogenesis at the molecular level is necessary for sufficient control of cancer, the leading cause of death among Japanese people. Such understanding is indispensable for development of new cancer diagnosis/treatment methods. In recent years, thorough analysis of RNA including non-coding RNA has been advanced after the end of genome project, and the diverse relationships between carcinogenesis and RNA have been revealed increasingly. At this laboratory, new mechanisms for carcinogenesis are explored on the basis of molecular biological analysis covering RNA, viruses, etc., and systematical education/research, ranging from basics to applied one, will be provided concerning development of new cancer diagnosis/treatment methods making use of the findings from such exploration.
10	Laboratory	**Molecular and Cellular Dynamics Research**
	Instructor	Jin-Min Nam, Lecturer
	Outline	Nowadays, radiation therapy is commonly used for treatment of cancer. However, the radiation effects and its molecular mechanisms on cancer or normal tissues still remain elusive. We have been investigating the acquisition process and molecular mechanisms of invasiveness on cancer cells in the presence of stress such as radiation considering three-dimensional cell structure and microenvironment using the experiment techniques of molecular biology, cell biology and biochemistry. Through the research program, we train students to be world-leading scientists and educators with great expertise in cancer research and experimental techniques.