2014 Academic Year
Admissions Guidelines for
Applicants to
Joint Education Program

Dentistry
Doctoral Course (Dentistry Program)
(For students enrolling in October 2014)

Tohoku University
Graduate School of Dentistry
1. These admissions guidelines are for applicants who wish to enroll in the Joint Education Program with Tianjin Medical University, China in the academic year 2014. The qualifications and requirements are stated in the Memorandum and Details of the Program.

2. The student who applies for this program must submit the following document to the Tohoku University Graduate School of Dentistry.

   (1) Application for admission (Form I)
   (2) Statement of the reason for applying to the program (Form II)
   (3) Official certificate of recommendation (Form III)
   (4) Examination Ticket and Photo Sheet (Form IV)
      Please attach a current photograph* of yourself on the Photo Sheet. *Taken within the past 3 months showing head/upper body, with head uncovered, 4.5cm high × 3.5cm wide.
   (5) Recommendation letter from supervisor
   (6) Undergraduate transcripts
   (7) Master transcripts *(not required for 5-year PhD Course students )
   (8) Certificate of Graduation (Undergraduate)
   (9) Certificate of Graduation (Master) *(not required for 5-year PhD Course students )
   (10) Certificate of English ability

3. Screening will be conducted through a review of the above documents and an internet interview.

4. The schedule of the application is as follows.
   <Deadline for submission of the application>: June, 2014 (Date to be announced later)
   <Screening>: July, 2014 (Date to be announced later)
   <Announcement of application results>: July, 2014 (Date to be announced later)

5. Enrollment Procedures

   Enrollment Procedures are scheduled for mid-September 2013.
   Details will be provided in writing along with acceptance notices.
Tohoku University, Graduate School of Dentistry  
(Doctoral Course)  
Admissions Guide

1. Educational Principles

This graduate school's mission is to contribute to the maintenance and improvement of human health and welfare through the progress and development of dentistry. Our goals are to train researchers, educators, and clinical dentists with high levels of expert knowledge and deep insight, who will contribute to communities and societies both locally and globally.

2. Major Field/Professor/Main Research Topics

*Applicants are advised to contact their academic advisor before applying.

<table>
<thead>
<tr>
<th>Course etc.</th>
<th>Major Field/Professor</th>
<th>Main Research Topics</th>
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</table>
| Oral Biology | Oral Ecology and Biochemistry  
Nobuhiro Takahashi |  
- Genomics, proteomics and metabolomics of oral biofilm  
- Metabolism and pathogenicity of microorganisms associated with dental caries, periodontal disease and oral malodor, using an anaerobic experimental system  
- Caries-preventive properties of sugar alcohols/fluoride and cariogenic evaluation of food products using pH telemetry  
- Oral biofilm-induced deterioration of dental biomaterials  
- Metabolomics of oral cancer |
|  | Dental Pharmacology  
Minoru Wakamori |  
- Functional analysis of Ca\(^{2+}\)-permeable cation channels  
- Molecular and neurobiological studies of taste, pain and mechanical stress |
|  | Oral Microbiology  
Haruhiko Takada |  
- Innate immunity and immune intranet in oral mucosa  
- Peptidoglycan of bacterial cell-walls in relation to innate Immune system  
- Immunobiological activities of bacterial components, especially those of oral bacteria  
- Mechanisms of apoptosis induced by various anti-cancer drugs |
<table>
<thead>
<tr>
<th>Area</th>
<th>Research Topics</th>
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</table>
| Periodontology and Endodontology | - Study on an onset-mechanism of endodontic/periodontal diseases using molecular biological approach  
- Development of objective diagnosis of disease conditions in endodontic/periodontal disease  
- Development of endodontic/periodontal therapy with use of bioactive molecules and growth factors  
- Study on an interaction between endodontic/periodontal diseases and general status  
- Study on an endodontic/periodontal therapy with use of laser  
- Development of a novel biomaterial scaffold for periodontal regeneration |
| Oral Molecular Bioregulation | - Immunoregulations in oral mucosal cells  
- Mechanisms of metal allergy development  
- Molecular mechanism of salivary gland diseases  
- Pharmacology and toxicology of bisphosphonates  
- Regulation of inflammation by biotin  
- Histamine in immunology and physiology |
| Oral and Craniofacial Anatomy | - Gross anatomical studies on human oro-facial structures  
- Nociceptive transduction from oro-facial regions  
- Innervation of pharynx and its adjacent regions for swallowing |
| Dental and Digital Forensics | - Morphological studies on the human skeletal remains  
- Application of dental information in identification  
- Mass fatality incident management and assistance  
- Morphological studies on the teeth of Japanese  
- Comparative odontology on the mammals |
| Oral Physiology             | - Neural mechanisms of tongue motor control in primary somatosensory cortex of awake animals  
- Psychophysical studies on gustatory function and oral fat sensitivity  
- Molecular mechanisms of mechanical stress reception in periodontal tissues  
- Molecular mechanisms of differentiation, regeneration, and apoptosis in osteoblasts and neurons |
| Advanced Prosthetic Dentistry | - Development and clinical application of novel biomaterials and creation of novel Interfaces for prosthodontics and maxillofacial prosthetics  
- Biomechanical analyses for stomatognathic function and prosthodontics, dental implantology based on in vivo measurements  
- Molecular imaging, histological and molecular biological studies on mechanobiology related to prosthodontics and dental implantology  
- Studies on transplantations and regeneration for prosthodontics and maxillofacial prosthetics  
- Studies on long-term outcome of prosthodontic, maxillofacial prosthetic, and dental implant treatments |
<table>
<thead>
<tr>
<th>Field</th>
<th>Research Areas</th>
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</table>
| **Aging and Geriatric Dentistry** | Yoshinori Hattori  
- Analysis of causal relationship of oral and systemic health through large-scale cohort study  
- Development of evaluation methods of oral functions by applying and combining diverse modalities  
- Research on characteristics of oral functions and their change with age  
- Development of evaluation methods and criteria for determining the indication of dental treatment for the elderly  
- Study on the delivering system of multidisciplinary dental care for the elderly  |
| **Comprehensive Dentistry**   | Masahiko Kikuchi  
- Research on periodontal tissue regeneration by applying periodontal ligament cells  
- Research on the relationship between deficit of teeth, periodontal disease and systemic illness  
- Research on circadian rhythm of toothache  
- Oral hygiene and oral microorganisms common in senior citizens  
- Development of effective treatment methods in primary care  |
| **Dental Biomaterials**       | Osamu Suzuki  
- Development of new dental titanium alloys and their clinical application  
- Research on mild antimicrobial or bacteriostatic dental alloys  
- Research on functional devices and dental applications using magnets  
- Research on new cutting-free dental materials suited to the CAD/CAM system  
- Research on deterioration and safety of dental materials in an oral cavity  |
| **Restorative Dentistry**     | Masahiro Saito  
- Development of Tooth Regeneration Therapy  
- Investigation of molecular mechanisms that regulate periodontal ligament regeneration  
- Conservative dentistry for cardiovascular disease  
- Cell transplantation therapy for periodontal disease  
- Development of novel dental material that possesses anti-inflammatory ability  
- Clinical research on dental metal allergies  |
| **Molecular and Regenerative Prosthodontics** | Hiroshi Egusa  
- iPS cell-based oral tissue engineering  
- Regulation of functions and differentiation of iPS cells  
- Xeno-free culture of human gingiva-derived iPS cells  
- Biomimetic materials for bone tissue engineering  
- Chemical biology for bone regenerative medicine  
- Osteo-immunology in alveolar bone resorption  
- Development of genome-based diagnostics for dental treatments  
- Basic and clinical research on all-ceramic restorations |
<table>
<thead>
<tr>
<th>Oral Health and Development Sciences</th>
<th>Preventive Dentistry</th>
<th>Studies and Research Areas</th>
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</table>
|                                     | Takeyoshi Koseki     | • Study of diagnosis and prevention of early caries of enamel and root surfaces  
|                                     |                      | • Study of etiology of halitosis and development of diagnostic tools  
|                                     |                      | • Analysis of trigger to develop destructive periodontal lesions  
|                                     |                      | • Development of mass screening methods of dental diseases  
|                                     |                      | • Development of intelligent health monitor system mounted in oral cavity |

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<tr>
<th>Oral Health and Development Sciences</th>
<th>Pediatric Dentistry</th>
<th>Studies and Research Areas</th>
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|                                     | Satoshi Fukumoto    | • Identification of novel gene associated with tooth development  
|                                     |                      | • Study of enamel formation  
|                                     |                      | • Analysis of affected gene in oral disease  
|                                     |                      | • Study of tooth germ and salivary gland using organ culture  
|                                     |                      | • Study of genetic oral disease and stem cell research  
|                                     |                      | • Development and evaluation of new materials for the prevention of dental caries |

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<thead>
<tr>
<th>Oral Health and Development Sciences</th>
<th>Orthodontics and Dentofacial Orthopedics</th>
<th>Studies and Research Areas</th>
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</table>
|                                     | Teruko Takano-Yamamoto                  | • Morphological change of bone remodeling to mechanical stress  
|                                     |                                        | • Basic and clinical studies on cranio-facial normal and abnormal growth, and development  
|                                     |                                        | • Histological and molecular biological study of periodontal ligament cells and bone cells  
|                                     |                                        | • Basic study on development of artificial tooth germ  
|                                     |                                        | • Basic and clinical research of tooth movement by orthodontic force  
|                                     |                                        | • Pain control on orthodontic tooth movement  
|                                     |                                        | • Functional evaluations by improvement on occlusion  
|                                     |                                        | • Development of orthodontic treatment using implant anchorage  
|                                     |                                        | • Analysis of mechanism of osteoclast differentiation and activation  
|                                     |                                        | • Identification of inhibitory factors against pathological bone resorption |

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<tr>
<th>Oral Health and Development Sciences</th>
<th>Oral Dysfunction Science</th>
<th>Studies and Research Areas</th>
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</table>
|                                     | Kaoru Igarashi            | • Research on efficient tooth movement  
|                                     |                            | • Research on the role of immune cells in osteoclastogenesis  
|                                     |                            | • Research on the diagnosis and treatment of maxillofacial congenital anomalies, such as cleft lip and palate (CLP)  
|                                     |                            | • Development of new anti-inflammatory bisphosphonate drugs that also promote bone formation |

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<tr>
<th>Oral Health and Development Sciences</th>
<th>International Oral Health</th>
<th>Studies and Research Areas</th>
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|                                     | Ken Osaka                 | • Analysis of dental systems and oral health problems by international comparison and the control strategy  
|                                     |                            | • Research on effective oral care in Japanese nursing insurance and the medical system  
<p>|                                     |                            | • Research on cultivating methods and human resources involving international activities to promote oral health |</p>
<table>
<thead>
<tr>
<th>Field</th>
<th>Faculty</th>
<th>Research Areas</th>
</tr>
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<tbody>
<tr>
<td>Oral Medicine and Surgery</td>
<td>Hiroyuki Kumamoto</td>
<td>• Molecular investigation on lesions of the jawbones</td>
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<td>• Clinicopathological and genetic investigation on tooth development anomaly</td>
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<td>• Clinicopathological and immunohistochemical investigation on oral immune diseases and cancer</td>
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<td>• Investigation on regeneration therapy using biomaterials</td>
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<td>Takashi Sasano</td>
<td>• Study on the relationship between systemic diseases and oral symptoms.</td>
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<tr>
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<td>• Diagnosis and treatment for taste disorder</td>
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<td></td>
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<td>• Diagnosis and treatment for dry mouth</td>
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<td></td>
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<td>• Diagnosis and treatment for autoimmune and oral mucosal diseases</td>
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<td>• Study on the oral and maxilla-facial imaging.</td>
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<td>• Histo-physiological study on sympathetic modification of pain</td>
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<td>• Neurophysiological study on the relationship between pain and microcirculation in the oral tissues.</td>
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<td>• Molecular biological study on mechanisms of autoimmune and oral mucosal diseases</td>
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<td>Tetsu Takahashi</td>
<td>• Research on morphological and functional reconstruction in the oral and maxillofacial area</td>
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<td>• Research on bone augmentation using distraction osteogenesis and periosteal expansion</td>
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<td>• Research on bone augmentation for implant placement</td>
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<td>• Research on dento-alveolar reconstruction in cleft lip/palate patients</td>
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<td>• Research on pathophysiology of temporomandibular joint disorders</td>
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<td>• Basic and Clinical research on bone substitute</td>
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<td>• Research on control of growth and invasion of oral cancer</td>
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<td></td>
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<td>• Research on surgical reconstruction for oral cancer</td>
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<td>• Development of dental implant materials with property of osteoinduction</td>
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<td></td>
<td>Eiji Masaki</td>
<td>• Clarification of pain regulatory systems in the spinal cord</td>
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<td>• Development of new therapeutic modalities for intractable pain including postoperative pain</td>
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<td>• Development of new therapeutic approaches for bronchial-spasm and asthma</td>
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<td>• Investigation into lung epitheliums with regard to therapies of COPD</td>
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<td>Yasuyuki Sasano</td>
<td>• Development, regeneration and healing of bones, teeth and periodontal tissues</td>
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<td>• Regulatory mechanisms of calcification</td>
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<td>• Remodeling of extracellular matrices in calcified tissues</td>
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<tr>
<td></td>
<td></td>
<td>• Regulatory mechanisms of extracellular matrices on cell differentiation in calcified tissues</td>
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</tbody>
</table>
| Craniofacial Function Engineering | Synthetic biomaterials used for hard tissue regeneration, including bone, tooth and the related tissues  
Bone regeneration by octacalcium phosphate (OCP) originally synthesized  
Biomineralization of OCP and other calcium phosphates to form hydroxyapatite (HA)  
Drug delivery systems for bone regeneration  
Biomaterial surface and protein adsorption |
| Community Oral Health Science | Construction of an oral health support system and program for the community  
Elucidation of oral health factors related to general health  
Genomics for oral health maintenance and promotion |
| Oral Cancer Therapeutics | Regulatory mechanism of oral tumor proliferation, invasion and metastasis by small GTPases  
Research on lipid modification of small GTPases  
Sensing mechanism of intracellular nutrients  
Basic and clinical research on thrombus formation |
| Molecular Oral Oncology | Roles of Nrf2 in cancer initiation and promotion  
Stress response mechanism and metabolic reprogramming in cancer cells  
Intranuclear redox homeostasis and genome protection in carcinogenesis  
Stress response mechanism in cell senescence |
| Intractable Diseases and Immunology | Pathogenesis of autoimmune diseases, such as autoimmune diabetes and Sjogren's syndrome  
Pathogenesis of metal allergy  
The immune surveillance mechanism in cancer  
The immune response mechanism in infectious diseases, such as viral hepatitis and new strain of influenza |
| Advanced Biomaterials | Development of self-organizing substitutional biocompatible materials with superior strength, elasticity, and water retentivity  
Development of surface texture process techniques in titanium and hydroxyapatite enhancing cellular adhesiveness and tissue integration  
Development of hybrid artificial tissue with cell affinity, adhesiveness, water retentivity, heat-retaining properties, and workability |
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<tr>
<th><strong>Advanced Biofunctional Materials</strong></th>
<th>Mitsuo Niinomi</th>
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<tbody>
<tr>
<td>• Development of biofunctional materials such as dental implants and artificial bones harmonized with biofunction</td>
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<td>• Development of biofunctional materials with mechanical and biological properties as well or better than those of body tissues</td>
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<td>• Development of high functional materials supporting the biofunction lost by disease</td>
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<tr>
<th><strong>Biodental Engineering</strong></th>
<th>Shinji Kamakura</th>
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<tbody>
<tr>
<td>• Bone regeneration by octacalcium collagen composite</td>
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<tr>
<td>• Establishment of a new animal model for bone regeneration</td>
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<td>• Research for quantification of regenerated bone tissue</td>
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<tr>
<th><strong>Immune Regulation and Oral Immunity</strong></th>
<th>Satoshi Takaki</th>
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<tbody>
<tr>
<td>• Signal transduction and regulation in humoral immune responses</td>
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<tr>
<td>• Mechanisms for the generation and function of auto-antibodies involved in various autoimmune diseases</td>
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<tr>
<td>• Development of methods for manipulating or reconstituting the immune system</td>
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<thead>
<tr>
<th><strong>Geriatric Oral Science</strong></th>
<th>Kenji Matsushita, Shumpei Niida</th>
</tr>
</thead>
<tbody>
<tr>
<td>• The role and application of nitric oxide in the periodontal tissue</td>
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<tr>
<td>• Diagnosis and control of the periodontosis</td>
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<tr>
<td>• Exploratory research of the aging and disease related biomolecule by omics analysis</td>
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</tbody>
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### 3. Other

If you have any questions regarding enrollment etc., please inquire with the following Educational Records and Programs Section. When making inquiries by postal mail, please enclose a self-addressed stamped envelope.

**Tohoku University, Graduate School of Dentistry**

4-1, Seiryo-machi, Aoba-ku,
Sendai-city, 980-8575
e-mail: den-kyom@bureau.tohoku.ac.jp
(Tohoku University School/Graduate School of Dentistry Educational Records and Programs Section)

The Application Guidelines/Enrollment Guide can also be viewed at the below website.

**URL:** [http://www.dent.tohoku.ac.jp/english](http://www.dent.tohoku.ac.jp/english)