



April 24, 2006

MEMORANDUM

SCHOOL OF DENTISTRY

TO: Sherry Queener, Ph.D.
FROM: Richard L. Gregory, Ph.D. *Richard L. Gregory*
RE: Revised Dental Biomaterials Track in Dental Science Ph.D. Program

As we discussed recently please find enclosed the revised track in Dental Biomaterials in our PhD program. As you know we have had a Dental Materials track in our program for several years and have wanted to change this in light of the growing interactions with biological research and the materials science fields. Dr. Taskonak developed this revision and I feel he has done a wonderful job incorporating a great element of collaboration between the Purdue University School of Materials Science and Engineering (on the West Lafayette campus), the Indiana University Department of Biomedical Engineering (on this campus) and our Division of Dental Biomaterials. I have also enclosed letters of support from Dr. Keith Bowman, Chair of the Department of Materials Engineering at the Purdue University School of Materials Science and Engineering and Dr. Ed Berbari, Chair of the Indiana University Department of Biomedical Engineering. I am requesting that your office review these plans and if appropriate please forward them to the next office for final approval. We feel that the changes contained in the revision are important but yet are a simple retooling of our existing program. We would like to begin offering this program as soon as we can. Please contact me with any questions you may have on this revised track. Thank you so much.

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DEPARTMENT OF ORAL BIOLOGY

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Indianapolis, Indiana
46202-5186

317-278-1355
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*Located on the campus of
Indiana University
Purdue University
Indianapolis*

Indiana University School of Dentistry
PhD in Dental Sciences, Dental Biomaterials Track

Program Description:

The Indiana University School of Dentistry, Division of Dental Biomaterials, in conjunction with the Purdue University School of Materials Science and Engineering and the Indiana University Department of Biomedical Engineering, offers a graduate program leading to a Ph.D. in Dental Sciences with specialization in Dental Biomaterials.

Course work will be taken through the Indiana University School of Dentistry, Purdue University School of Materials Science and Engineering, and Purdue University Department of Biomedical Engineering. Dissertation research is conducted within the departments mentioned above based on the students area of research interest. Financial aid for graduate students may be available from a number of sources within the Indiana University / Purdue University (IUPU) System.

Subspecialty areas within dental biomaterials include ceramics, polymers, metals, biomechanics and tissue engineering. However, students are encouraged to combine their specialties with other scientific disciplines, (i.e., biomimetics).

This program is designed for individuals who have a background in either engineering or dentistry. Candidates who have backgrounds in both fields, i.e.,

Bachelors in Materials or Mechanical Engineering and a DMD or a DDS degree, are strongly encouraged to apply.

Interested individuals may apply to Ph.D. track program in Dental Biomaterials and to a certificate or masters degree in one of the clinical specialty programs of Prosthodontics, Operative Dentistry, Periodontics or Orthodontics, at the same time. Interested individuals should apply to each program separately. Applicants may receive admittance to Ph.D. program, however their admittance to a clinical specialty program will be conditional based on graduation from the Ph.D. program

Graduates of this program will be equipped with expertise to pursue an academic career in the field of dentistry, materials engineering and biomedical engineering. Additional opportunities are available to graduates who are planning to pursue a career in the Dental Materials industry.

Tuition:

Students enrolled in the Ph.D. programs will be charged either the Indiana resident or non-resident (determined by residency) per credit hour rate throughout the entire course of study. Currently the credit hour rate is:

Indiana Resident: \$201.85 per hour

Non-Resident: \$582.55 per hour

Financial Aid:

Financial aid may be available to qualified individuals in the forms of grants and fellowships. Perspective students are encouraged to contact individual MSE, BME and Dental Biomaterials faculty to discuss their research interests and possible assistantship support. US citizens or permanent residents who hold a DDS or a DMD degree are strongly encouraged to apply for NIH (National Institutes of Health) training grants. The Division of Dental Biomaterials will provide assistance and consulting to serious candidates who are willing to apply for these grants. Detailed information can be found at the NIH web site:

<http://grants1.nih.gov/training/careerdevelopmentawards.htm>

Application Process:

Applicants apply only to Indiana University School of Dentistry and send application materials directly to Ms. Barbara Lerner (blerner@iupui.edu). Any procedural questions should be directed to Dr. Richard Gregory, Director of the Ph.D. program. Specific questions related to curriculum and requirements should be directed to Dr. Burak Taskonak (btaskona@iupui.edu).

The application package must include:

- Graduate Application

(<http://www.iusd.iupui.edu/depts/EDU/SA/PhDapplication.htm>).

- Official undergraduate and graduate transcripts sent from each school
- A non-refundable application fee of \$30 payable to Indiana University
- Photograph 2x2
- Three letters of reference

- A statement of purpose
- Graduate Record Examination scores (School Code: 1325)
- National Dental Board Scores are asked from applicants who hold a DDS or DMD degree

International applicants who hold a dental degree: Students having degrees from institutions not accredited by the American Dental Association will be considered for admission only after it has been determined that their academic backgrounds are equivalent to requirements set forth by the Council on Dental Education.

Additional applicant materials required for International applicants are as follows:

1. Official academic records corresponding to the transcripts issued in the United States (certificates, mark sheets, study lists, examination results, etc.) from dental schools and all other colleges and universities attended.

2. All transcripts must be translated and certified by the Educational Credential Evaluators, Inc., P.O. Box 92970, Milwaukee, WI 3202-0970, (414) 289-3400.

(<http://www.ece.org>). A "course-by-course" report is required from E.C.E.

3. TOEFL Scores: Use institutional code (1325) for reporting your scores.

<http://www.toefl.org>

4. National Dental Board Scores -

Joint Commission on National Dental Examinations

211 East Chicago Ave., #1846

Chicago, IL 60611

800-621-8099 ext 465

<http://www.ada.org>

Ph.D. Degree Requirements

- 90 Total credit hours
- Students who do not have Material Science Engineering Background must take Introduction to Materials Engineering (MSE 530 or MSE 230) as a graduate student
- Students for whom English is not a native language will be required to take the Test of Spoken English within their first month of enrollment in the Program. Students who receive a score of 49 or below on this exam will be required to enroll in an English Listening/Speaking Class the following semester.

Course Requirements:

All students must take core classes which are listed on the following page and pass each with a grade of "B" or better. Students are expected to complete these courses in their first year of enrollment. In addition to the core classes, students must choose an area of specialization (see below) with the guidance of the student's advisory committee and pass the courses for their specialty with an average of "B" or better. They are expected to complete the courses for their specialty by the end of their second year of enrollment. In the event a student does not receive a grade of "B" or better in each of the six required core classes, the student may retake the course the following year, but not for credit. Students who receive a grade of "B" or better may then proceed to the qualifying exam.

Core Courses:

Biochemistry-Microbiology (3 Credits)

- B 500 Introduction to Biochemistry (3 Credits) or
- G 959 Graduate Oral Microbiology (3 Credits)

General Graduate (10 or 11 Credits)

- G651 Introduction to Biostatistics I (2 Credits)
- G652 Introduction to Biostatistics II (2 Credits)
- G504 Introduction to Research Ethics (2 Credits) or
- G 505 Responsible Conduct of Research (1 Credits)
- G 655 Research Communications Seminar (2 Credits)
- J 500 Instruction in the Context of Curriculum (3 Credits) or
- 608 Measurement Theory and Data Interpretation (3 Credits) or
- R 503 Instructional Media Applications (3 Credits)

Elective Classes:

Offered by the Purdue University School of Materials Science & Engineering (MSE) or Indiana University School of Dentistry

- MSE 530 or MSE 230 Introduction to Materials Engineering (3 Credits)
- MSE 240 Processing and Properties of Materials (3 Credits)
- MSE 335 Materials Characterization Laboratory (3 Credits)
- MSE 350 Thermodynamics of Materials (3 Credits)
- MSE 382 Mechanical Response of Materials (3 Credits)
- The MSE Graduate Seminar (1 Credit)
- G911 Dental Materials Science and Engineering (3 Credits)

- G912 Properties and Test Methods: Dental Materials (3 Credits)
- G913 Clinical Applications of Dental Materials (3 Credits)
- G910 Seminar: Dental Materials (1 Credit)
- G865 Fundamental Molecular Biology (3 Credits)
- M527 Advanced Mathematics for Engineering And Physics I (Offered through Department of Mathematical Sciences) (3 Credits)
- R956 Current Topics in Oral Biology (4 Credits)

Specialty Courses in Addition to the Core Courses:

These courses are offered by the Purdue University School of Materials Science & Engineering (MSE) in West Lafayette Campus; Indiana University School of Dentistry on the Indianapolis Campus; and Indiana University Department of Biomedical Engineering (BME) on the Indianapolis Campus.

Polymers:

- MSE 597Y Polymer Synthesis (3 Credits)
- MSE 525 Structure-Property Relationships of Engineering Polymers (3 Credits)
- MSE 597B-A&AE 590M Manufacturing of Advanced Composites (3 Credits)
- Six credits graduate level coursework chosen by the student's advisory committee

Ceramics:

- MSE 510 Microstructural Characterization Techniques (3 Credits)

- MSE 512 Powder Processing (3 Credits)
- MSE 523 Physical Ceramics (3 Credits)
- MSE 556 Fracture of Materials (3 Credits)
- Three credits graduate level coursework chosen by the student's advisory committee

Metals:

- MSE 508 Phase Transformation in Solids (3 Credits)
- MSE 522 Rate Phenomena in Process Metallurgy (3 Credits)
- MSE 510 Microstructural Characterization Techniques (3 Credits)
- Six credits graduate level coursework chosen by the student's advisory committee

Biomechanics:

- BME 595C Skeletal Biomechanics (3 Credits)
- BME 595J Molecular, Cellular Biomechanics (3 Credits)
- MSE 556 Fracture of Materials (3 Credits)
- Six credits graduate level coursework chosen by the student's advisory committee

Tissue Engineering:

- BME 595E Tissue Engineering (3 Credits)
- BMS 523 Tissue Engineering (3 Credits)
- BME 601 Principles of Biomedical Engineering I (3 Credits)
- BME 602 Principles of Biomedical Engineering II (3 Credits)
- BME 595B Biomolecular Engineering (3 Credits)

Internet links to course's web pages can be found at:

<https://engineering.purdue.edu/MSE/Graduate/PhD.whtml> and

<http://www.iusd.iupui.edu/depts/EDU/SA/PhDindex.htm>

<http://www.engr.iupui.edu/bme/gradCourses.shtml>

Exceptions to Requirements for Ph.D. Degree

Students may petition not to take the required classes if they have taken similar courses elsewhere. The decision to approve or deny the petition will be made by the Student's Advisory Committee and the Director of the Ph.D. program. Students may petition to delay the qualifying examination until the end of their sixth semester.

Qualifying Exam:

Students who have passed each of the core classes with at least a grade of "B" in each class, and have fulfilled the course requirements for their specialty with an average grade of "B" or better in those classes may then take the qualifying exam. Students are strongly encouraged to take the qualifying exam at the end of their third semester if the course requirements have been met. All students are required to take the qualifying exam no later than the first month of their sixth semester. No student may take the qualifying exam more than twice. The Ph.D. qualifying exam tests the student's ability to identify a significant problem, to assemble the background information needed to grasp it in the

context of the field, and to construct a technical approach that provides a plausible path to its solution. At the same time the qualifying exam will test the student's knowledge of the subject matter within the broad research field and his/her major field. The student's ability to actually bring research to a successful conclusion is tested by the Ph.D. dissertation.

The qualifying exam for a student in the doctoral program is administered by the student's advisory committee. The exam is comprised of two parts:

A) An oral defense of a written research proposal and

B) A written exam consists of two parts:

- General part that will test the student on basic Materials Engineering background.
- Specialty part that will test the student on his/her Materials Engineering specialty.

Proposal Defense:

The student chooses, usually by the end of the second Spring semester following enrollment, with the help from and approval of the Advisory Committee Chair, a topic for a grant proposal to be written and defended as part of the qualifying exam. The topic may be in the area of the student's intended dissertation research, but cannot be the subject of the dissertation research project itself or prepared as a requirement of another course.

The student should begin with an outline for a proposal that is approved by the Committee Chair. After approval, the student writes a proposal in the style

of an NIH R01 grant proposal including the following sections: Summary, Specific Aims, Background and Significance, Research Design and Methods, Literature Cited and Budget, but with the length reduced to a maximum of 15 single-spaced, 12-point font pages for the following sections: Summary, Specific Aims, Background and Significance, and Experimental Design. There are no page limits for the Literature Cited and Budget sections. The proposal, once written to the satisfaction of the student, is submitted to the Advisory Committee Chair, who distributes copies to the rest of the Committee. The Committee may decide that the proposal is defensible, or it may require revisions prior to a defense. Upon final approval, a time is set for defense of the proposal by the student in the presence of the Committee.

The defense of the proposal consists of a 30 to 45 minute presentation of the proposed work by the student, followed by a 1-3 hour oral examination consisting of questions arising from the proposal, the student's presentation or answers to initial questions. Satisfactory defense of the proposal will be followed, at a date and time (within 60 days after the proposal defense) convenient to the members of the committee and student, by a written exam. Students who do not satisfactorily complete the defense of the proposal may be allowed to retake the proposal defense with the permission of the advisory committee.

Information about faculty and their research interests can be found at:

Indiana University School of Dentistry

<http://www.iusd.iupui.edu/depts/Rsch/researchers.htm>

Purdue University School of Materials Science and Engineering

https://engineering.purdue.edu/MSE/Fac_Staff/Faculty/index.whtml

Indiana University Department of Biomedical Engineering

<http://www.engr.iupui.edu/bme/faculty.shtml>

Doctoral Dissertation

A written doctoral dissertation and dissertation defense are required to complete the program. The student's research committee will grade the dissertation with a grade of pass or fail. The student's dissertation advisor will chair this exam.

After completion of all the requirements, the Ph.D. candidate will be awarded the Ph.D. degree and will gain the right to participate at the subsequent commencement.

August 26, 2005

Richard L. Gregory, Ph.D.
Professor of Oral Biology and Pathology & Laboratory Medicine,
Schools of Dentistry and Medicine
Director, Ph.D. Dental Science and Student Research Programs
Indiana University
1121 W. Michigan St., Rm OH123
Indianapolis, IN 46202

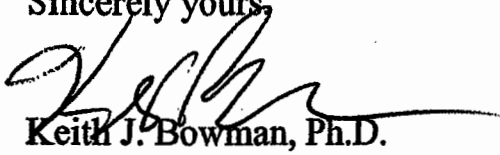
Dear Dr. Gregory,

I am writing to express my full support for your T32 NIH training proposal entitled "Training Program in Oral Health Research." Our faculty will participate in the PhD in Dental Sciences track in Dental Biomaterials by teaching the appropriate courses and serving on student's advisory and research committees when appropriate. Our faculty will also serve as research mentors for PhD students in this program when it is mutually beneficial to the faculty member and student. Our academic programs have been developed around broad and basic phenomena, applied to all the major classes of materials – ceramics, metals, glasses, polymers and semiconductors. The addition of a greater emphasis on biological materials and applications within the field of health is consistent with an ongoing broadening of expertise in our programs. Our programs integrate faculty strengths across the four cornerstones of the field: structure, properties, processing, and performance. Within each of these topic areas we have an array of faculty who perform experimental investigations, structural characterization and computational modeling.

The Purdue School of Materials Engineering is undergoing unprecedented growth with an increase in the number of faculty from 12 to 20 over the last five years. In concert with this growth is an expansion and updating of our academic program to fully integrate the broadened strengths offered by the new faculty. The opportunity to expand our knowledge and experience base through research interactions and

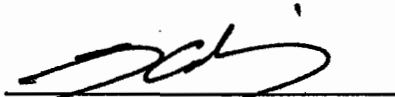
collaborations with faculty and students from the Dental Sciences Program of Indiana University would be tremendously beneficial to our program.

Sincerely yours,

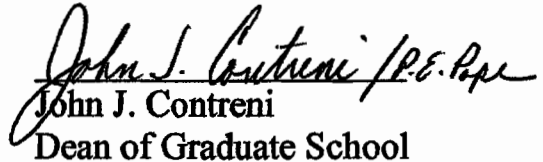


Keith J. Bowman, Ph.D.

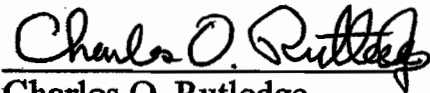
Interim Head and Professor of Materials Engineering
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Linda P. B. Katehi
John A. Edwardson Dean
of Engineering



John J. Contreni
Dean of Graduate School



Charles O. Rutledge
Vice Provost for Research

April 21, 2006

Richard L. Gregory, Ph.D.
Professor of Oral Biology, Preventive and Community Dentistry, and Pathology &
Laboratory Medicine
Schools of Dentistry and Medicine
Director, Ph.D. Dental Science and Student Research Programs
Indiana University
1121 W. Michigan Street
Indianapolis, IN 46202

PURDUE SCHOOL OF
ENGINEERING
AND TECHNOLOGY



Dear Dr. Gregory,

I am writing to express my full support as Chair of Biomedical Engineering for the Ph.D. degree program in Dental Sciences track in Dental Biomaterials. Courses currently offered by our faculty may be of some interest for your prospective students. In addition several of our faculty would be qualified to serve on student advisory and research committees when appropriate. In some cases they could also serve as research mentors for PhD students in this program when it is mutually beneficial to the faculty member and student. Our academic programs have been developed around fundamental principles with both basic science and clinical applications. The addition of a greater emphasis on biological materials and applications within the field of health is consistent with an ongoing broadening of expertise in our programs. Our programs integrate faculty strengths across a number of different topics including orthopedic biomechanics, cardiovascular instrumentation, medical imaging, biomaterials, molecular engineering, biosensors, neurosciences, and tissue engineering. Within each of these topic areas we have an array of faculty who perform experimental investigations in neuroscience, cardiovascular science, and orthopedics.

The Department of Biomedical Engineering is undergoing rapid growth with an increase in the number of faculty to 10 over the last five years with three more planned in the next two years. In concert with this growth is an expansion and updating of our academic program to fully integrate the broadened strengths offered by the new faculty. The opportunity to expand our knowledge and experience base through research interactions and collaborations with faculty and students from the Dental Sciences Program of Indiana University would be tremendously beneficial to our program.

Sincerely,

A handwritten signature in cursive script that reads "Edward J. Berbari".

Edward J. Berbari, Ph.D.
Professor and Chairman of Biomedical Engineering
Professor of Medicine

BIOMEDICAL ENGINEERING

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