February 5, 2010

TO:  David Randall  
Senate Council  
201 Main Bldg.  
CAMPUS 0032

Dear Dr. Randall,

I am transmitting to you the Proposal for Change in Sensing Technologies Certificate to Bioactive Interfaces and Devices Certificate. The Graduate Council approved this proposal on February 4, 2010.

Sincerely Yours,

Jeannine Blackwell, Dean  
The Graduate School

Cc: Sheila Brothers
October 7, 2009

To: Dean Jeannine Blackwell
CC: Cleophus Price
From: Dr. Kimberly W. Anderson (PI - IGERT)

Subject: Change in Sensing Technologies Certificate to Bioactive Interfaces and Devices Certificate

As you know, we recently received NSF funding for a new Integrative Graduate Education and Research Training (IGERT) Program focused on Engineered Bioactive Interfaces and Devices. As part of a previous IGERT, Dr. Bachas (PI of that grant) established a certificate in Sensing Technologies. With the new IGERT having a broader focus, we are requesting that the Certificate in Sensing Technologies be changed to a Certificate in Bioactive Interfaces and Devices. This change will enable us to reach a much wider range of students and include faculty members in a wide range of disciplines across campus.

I am including detailed information on the proposed changes in certificate requirements. These proposed changes will better reflect the focus of the new program.

If you need further information regarding this request, please don’t hesitate to contact me either by phone at 859-257-4815 or by email at kanderson@engr.uky.edu.

Thank you.

[Signature]
Dr. Kimberly W. Anderson
Director of IGERT Program on Bioactive Interfaces and Devices

[Signature]
Dr. Eric Grulke
Associate Dean for Research, College of Engineering

Note: Signatures from Dr. Douglass Kalika, Chair of Chemical and Materials Engineering and Dr. Leonidas Bachas, Director of Certificate on Sensing Technologies is included on a separate page.
## Proposal for Sensing Technologies Certificate Changes

<table>
<thead>
<tr>
<th>Item</th>
<th>Current</th>
<th>Proposed</th>
<th>Explanation</th>
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</thead>
<tbody>
<tr>
<td>Director</td>
<td>Dr. Leonidas Bachas</td>
<td>Dr. Kim Anderson</td>
<td>The Certificate is based on a funded IGERT grant from the National Science Foundation. The PI on the new grant is Dr. Anderson and therefore, the Director on the Certificate needs to be changed also.</td>
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<tr>
<td>Name Change</td>
<td>Sensing Technologies</td>
<td>Bioactive Interfaces and Devices</td>
<td>update language to modern terminology to make certificate appeal to a wider range of students</td>
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<td>Objective:</td>
<td>Enhance graduate education through a cross-disciplinary curriculum in Sensors and Sensing Architectures. As the field of sensing development is an inherently multidisciplinary endeavor, the program will yield scientists and engineers with the ability to transcend traditional boundaries in their professional careers. The success of such students would also serve to increase the prestige of the departments and research ongoing at the University.</td>
<td>Enhance graduate education through a cross-disciplinary curriculum in Bioactive Interfaces and Devices. As the field of bioactive interfaces is an inherently multidisciplinary endeavor, the program will yield scientists and engineers with the ability to transcend traditional boundaries in their professional careers. The success of such students would also serve to increase the prestige of the departments and research ongoing at the University.</td>
<td>update language to modern terminology</td>
</tr>
</tbody>
</table>

**Faculty**

Remove:
- Craig Grimes
- Rob Lodder

Add:
- David Puleo
- James Geddes
- J. Zach Hilt
- Barbara Knutson
- Stephen Rankin
- Bruce Hinds
- Brad Anderson
- Tonglei Li
- David Rodgers
- Y.T. Cheng
- Rich Eitel
- Hainsworth Shin
- Heidi Mansour
- Younsoo Bae
- Marc Knecht

**Curriculum**

12 credits

11 - 12 credits

**Requirement 1**

3-4 credit hours of a multidisciplinary seminar. This will be offered every semester as a 1-credit hour course. Up to 1 credit hour may be replaced by a Professional Ethics course.

3 credit hours of a multidisciplinary seminar course (GS 660 – Bioactive Interfaces and Devices Seminar)

Focus of program has changed and the new seminar course reflects this. Ethics course is required in addition to 3 hours of seminar as indicated in Requirement 4

**Requirement 2**

A sensors-related course from outside the student’s home department. (2-3 credit hours)

3 credit hours of Bionanotechnology: Interfaces and Devices

- **CME 599** Section 001 - TOPS CHEM ENGR: BIONANOTECH ENGINEERING
- **CHE 580** Section 003 - TOPS IN CHEM: BIONANOTECHNOLOGY

New interdisciplinary class being offered with focus more related to Bioactive Interfaces.

**Requirement 3**  
6 credit hours from courses selected from a list of approved courses. These could be courses from the student’s home department.

- Bioanalytical Sensors (Chemistry)
- Molecular Modeling (Chemistry)
- Physical Principles of Sensing and Sensor Technology (Electrical Engineering)
- Chemometrics and Parallel Instrumentation (Pharmaceutical Sciences)

3 credit hours from any of the below:

- **BME 662** Tissue-Implant Interfaces
- **CHE 626** Instrumental Analysis
- **CME 599/780** Synthesis and Engineering of Advanced Materials
- **CME 599/CME 780/PHR 760** Drug Delivery

New certificate requires more required courses so the number of hours that can be chosen from this requirement has been decreased.

Many of the original classes are no longer offered and the new courses better reflect the focus of the current program.

BME 661 Biomaterials Science and Engineering
BCH 604, Structural Biology
BCH 610, Biochemistry of Lipids and Membranes
BCH 612, Structure and Function of Proteins and Enzymes
CHE 550, Biological Chemistry
CHE 522, Instrumental Analysis (non-Chemistry students only)
CHE 626, Instrumental Analysis (Chemistry or non-Chemistry students)
EE/MSE 569, Electronic Packaging Systems and Manufacturing Processes
PHR 630, Pharmaceutical Rate Processes
PHR 631, Equilibrium Phenomena in Pharmaceutical Systems
PHR 760, Techniques in Pharm. Analysis

Additional new courses that reflect the focus of the current program.
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<tr>
<th>Requirement 4</th>
<th>Ethics class could be taken in place of 1 hour of seminar</th>
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<tbody>
<tr>
<td><strong>EE/CHE/CME/MSE 664</strong></td>
<td><strong>EE/CHE/CME/MSE 664 Multidisciplinary Sensors Laboratory</strong></td>
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<tr>
<td><strong>CME 680</strong> Biochemical Engineering</td>
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</tr>
<tr>
<td><strong>CME 599</strong> Membrane Technology for Bio/Environmental Applications</td>
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<td>Ethics class is now required from the following (either 1 or 2 hours):</td>
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<td><strong>NS 609</strong> Ethics in Clinical Sciences Research (1hr)</td>
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<td></td>
<td><strong>TOX 600</strong> Ethics in Scientific Research (2 hrs)</td>
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<td></td>
<td>Ethics is becoming more important in research and a course should be required.</td>
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<th>Requirement 5</th>
<th>Microsensors and Microelectromechanical Systems (Electrical Engineering)</th>
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<tr>
<td><strong>MSE 599</strong> Chemical and Materials Fundamentals to Electronic and Nano-scale Device Fabrication (1 hr) or <strong>NanoFabrication Workshop</strong> (0 credits)</td>
<td>The original class was one of many elective options; the new class is required due to the program emphasis on device fabrication.</td>
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