Texas A&M University  
Departmental Request for a New Course  
Undergraduate • Graduate • Professional  
* Submit original form and attach a course syllabus.*

1. This request is submitted by the Department of  
   Electrical & Computer Engineering

2. Course prefix, number and complete title of course:  
   BCEN 660/661 BioMEMS and Lab-on-Chip

3. Course description (not to exceed 50 words):  
   Introduction to lab-on-a-chip technology; microfabrication techniques commonly used in  
   BioMEMS device fabrication; microfluidics miniaturized systems for chemical and biomedical applications such as separation, diagnosis  
   tools, implantable devices, drug delivery, and microsystems for cellular studies and tissue engineering; will gain a broad perspective in the  
   area of miniaturized systems for biomedical and chemical applications

4. Prerequisite(s):  
   Approval of instructor

   Cross-listed with:  
   Cross-listed courses require the signature of both department heads.

5. Is this a variable credit course?  
   □ Yes  
   ✗ No  
   If yes, from _____ to _____

6. Is this a repeatable course?  
   □ Yes  
   ✗ No  
   If yes, this course may be taken _____ times.
   Will this course be repeated within the same semester?  
   □ Yes  
   ✗ No

7. Has this course been taught as a 489/689?  
   ✗ Yes  
   □ No  
   If yes, how many times?  
   If, yes, how many times?  2
   Indicate the number of students enrolled for each academic period it was taught.  
   Fall '07-12, Fall '08-10

8. This course will be:  
   a. required for students enrolled in the following degree programs(s) (e.g., B.A. in history)
   b. an elective for students enrolled in the following degree program(s) (e.g., M.S., Ph.D. in geography)

   M.S., M.ENG, Ph.D. in Electrical & Computer Engineering

9. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments.  
   Attach approval letters.

10. Prefix Course # Title (excluding punctuation)  
    | BCEN | BCEN | BCEN | BCEN | BIO | MEM | & | LAB | A | A | CHI | P |
    |------|------|------|------|-----|-----|---|-----|---|---|-----|---|
    | Lect | Lab  | SCH  | CIP  | Admin Unit | Acad Year | HC | Code |   |   | Code |   |
    | 0    | 3    | 0    | 0    | 3    | 1    | 4 | 0   | 1 | 0 | 0    | 6 |
    | 0    | 9    | 3    | 6    | 0    | 9    | 1 | 0   | 0 | 0 | 3    | 6 |
    | 3    | 2    | 1    | 0    | 0    | 3    | 6 | 3   |   |   | 2    |   |

   Approval recommended by:  
   Level 6

   Head of Department  
   Date  
   Chair, College Review Committee  
   Date

   Head of Department (if cross-listed course)  
   Date  
   Dean of College  
   Date

   Submitted to Coordinating Board by:  
   Date  
   Effective Date

Questions regarding this form should be directed to Sandra Williams at 845-8201.  
Curricular Services – 11/07  
1 of 6 B1
Texas A&M University

Departmental Request for a New Course

Undergraduate • Graduate • Professional

Submit original form and 2 copies. Attach a course syllabus to each.

1. This request is submitted by the Department of [Electrical & Computer Engineering]

2. Course prefix, number and complete title: ECEN 6600 BioMEMS and Lab-on-a-Chip

3. Course description (not more than 50 words): The Lab-on-a-chip concept and its advantages will be introduced. Microfabrication techniques commonly used in BioMEMS device fabrication will be taught followed by introduction to microfluidics. Miniaturized systems for chemical and biomedical applications such as separation, diagnostic tools, implantable devices, drug delivery, and Microsystems for cellular studies and tissue engineering will be covered.

4. Prerequisite(s): Consent of instructor

5. Is this a variable credit course? □ Yes □ No [If yes, from ______ to ______.]

6. Is this a repeatable course? □ Yes □ No [If yes, this course may be taken ______ times. Will the course be repeated within the same semester/term? □ Yes □ No]

7. Has this course been taught as 489/689? □ Yes □ No [If yes, how many times? ______ Indicate the number of students enrolled for each academic period it was taught: Fall '97- '98, Spring '98-99]

8. This course will be:
   a. required for students enrolled in the following degree program(s) (e.g., B.A. in history)

   b. an elective for students enrolled in the following degree program(s) (e.g., M.S., Ph.D. in geography)

9. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. Attach approval letters.

<table>
<thead>
<tr>
<th>Prefix</th>
<th>Course #</th>
<th>Title (exclude punctuation)</th>
<th>Lect.</th>
<th>Lab</th>
<th>SCH</th>
<th>Subject Matter</th>
<th>Content Code</th>
<th>Admin. Unit</th>
<th>Acad. Year</th>
<th>FICE Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECEN</td>
<td>6600</td>
<td>BioMEMS and Lab-on-a-Chip</td>
<td>0</td>
<td>3</td>
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<td>3</td>
<td>1</td>
<td>4</td>
<td>0</td>
<td>1 0 0 0 3 8 3 2</td>
</tr>
</tbody>
</table>

Do not complete shaded area.

Approval recommended by:

Head of Department: [Signature] [Date: 10/13/08]

Chair, College Review Committee: [Signature] [Date: 12/15/09]

Dean of College: [Signature] [Date: 1/16/10]

Director of Academic Support Services: [Signature] [Date: 2/15/09]

Submitted to Coordinating Board by:

Dean of College: [Signature] [Date: 2/15/09]

To have this form reviewed, please access the Office of the Registrar and Stup 1265 or fax to 847-8737.

OARAS-594

OCT 13 2008

N.K. ANAND

2 of 6 B1
Department of Electrical and Computer Engineering, Texas A&M
ECEN 6610
BioMEMS and Lab-on-a-Chip

Time and Location: Fall 2008
Tu/Th 5:30PM – 6:45PM, ZAC 105D

Instructor: Prof. Arum Han, Department of Electrical and Computer Engineering
Office Hours: Tu/Th 10:00-11:00
Office: 235G WERC
Email: arum.han@ece.tamu.edu

Textbooks: S. S. Saliterman, Fundamentals of BioMEMS and Medical Microdevices, Wiley, 2005 (required)
Class notes and Handouts

References: A. Manz, H. Becker, Microsystem Technology in Chemistry and Life Sciences, Springer, 1999

Objectives: The field of BioMEMS and Lab-on-a-Chip has seen tremendous growth in the past several years. The Lab-on-a-chip concept and its advantages will be introduced. Various microfabrication techniques that are commonly used in BioMEMS device fabrications will be taught. Microfluidics, which is the foundation for most of the applications, will be covered followed by the various chemical and biomedical applications such as separation, minimally invasive diagnosis tools, implantable devices, drug delivery, and microsystems for cellular studies and tissue engineering. Students will gain a broad perspective in the area of miniaturized systems for biomedical and chemical applications.

Topics: Microfabrication for MEMS and BioMEMS
Microfluidics
Lab-on-a-Chip systems for chemical and biomedical applications
Recent trend in BioMEMS

Prerequisite: None
<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>8/26</td>
<td>Introduction to MEMS and BioMEMS</td>
</tr>
<tr>
<td>8/28</td>
<td>Microfabrication techniques for MEMS</td>
</tr>
<tr>
<td>9/2</td>
<td>Microfabrication techniques for BioMEMS I</td>
</tr>
<tr>
<td>9/4</td>
<td>Microfabrication techniques for BioMEMS II</td>
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<tr>
<td>9/9</td>
<td>MEMS Actuators</td>
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<tr>
<td>9/11</td>
<td>Principles of Microfluidics</td>
</tr>
<tr>
<td>9/16</td>
<td>Surface Chemistry</td>
</tr>
<tr>
<td>9/18</td>
<td>Microfluidic devices I</td>
</tr>
<tr>
<td>9/23</td>
<td>Microfluidic devices II</td>
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<tr>
<td>9/25</td>
<td>Microfluidic devices III</td>
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<tr>
<td>9/30</td>
<td>Miniaturized Chromatography systems</td>
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<td>10/2</td>
<td>Chemical analysis systems</td>
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<td>10/7</td>
<td>Midterm</td>
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<td>10/9</td>
<td>Particle separation systems</td>
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<td>10/14</td>
<td>Drug delivery devices</td>
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<tr>
<td>10/16</td>
<td>Implantable devices</td>
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<tr>
<td>10/21</td>
<td>Microsystem for DNA/Protein analysis</td>
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<tr>
<td>10/23</td>
<td>Minimally invasive diagnosis tools</td>
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<td>10/28</td>
<td>Neural Interface</td>
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<tr>
<td>10/30</td>
<td>Microsystems for Cellular studies I</td>
</tr>
<tr>
<td>11/4</td>
<td>Microsystems for Cellular studies II</td>
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<tr>
<td>11/6</td>
<td>Microsystem for Tissue Engineering</td>
</tr>
<tr>
<td>11/11</td>
<td>BioMEMS Packaging</td>
</tr>
<tr>
<td>11/13</td>
<td>Nanotechnology in BioMEMS I</td>
</tr>
<tr>
<td>11/18</td>
<td>No Class (Make up)</td>
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<tr>
<td>11/20</td>
<td>Nanotechnology in BioMEMS II</td>
</tr>
<tr>
<td>11/25</td>
<td>Class Presentations I</td>
</tr>
<tr>
<td>11/27</td>
<td>No Class. Thanksgiving</td>
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<tr>
<td>12/4</td>
<td>Class Presentations II</td>
</tr>
<tr>
<td>12/10</td>
<td>Final Exam (3:30 – 5:30 PM)</td>
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</tbody>
</table>
Project: Choose a BioMEMS/Lab-on-a-Chip system/device/application and write a review paper. Come up with a design of a device/system that you might think works better than existing designs. Paper will be due toward the end of the term. Presentation will occur during the second half of the term, approximately 15 minutes long.

Grading: Homework & Attendance 10% (10 points), Midterm 30% (30 points)
Project paper and presentation 30% (30 points)
Final 30% (30 points)

Project paper and presentation will be graded based on how good of a review you provide for your selected topic, how logical, innovative, and feasible your proposed idea is, and how well you present your work to the class.

Your grades will be calculated on the basis of total points earned. The points can be curved based on class average and may lower the following standard.
A  90-100 (out of 100)
B  80-89 (out of 100)
C  70-79 (out of 100)
D  60-69 (out of 100)
F  59 and lower (out of 100)

Late Submissions
Late submissions of assignments will be accepted only in the case of University excused absences.

Academic Dishonesty and Plagiarism
The handouts used in this course are copyrighted. The definition of "handouts" is all materials generated for this class, which include but are not limited to syllabi, homework assignments, in-class materials, and additional printed materials except published scientific papers for personal use. Because these materials are copyrighted, you do not have the right to make additional copies of the handouts unless the instructor of this course expressly grants permission. As commonly defined, plagiarism consists of passing off the ideas, words, writings, etc., of another as one's own. In accordance with this definition, you are committing plagiarism if you copy the work of another person without proper citation and acknowledgement, and turn it in as your own, even if you should have the permission of that person. Plagiarism is one of the worst academic offenses, for the plagiarist destroys the trust among colleagues without which research cannot be safely communicated. Paraphrasing without proper citation and acknowledgement is one form of plagiarism. If you have any questions regarding plagiarism, please consult the latest issue of the Texas A&M University Student Rules, under the section "Scholastic Dishonesty". Any forms of dishonesty including, but not limited to, cheating on any examinations and plagiarism on the Review project will be handled according to the procedures outlined by the Aggie Honor System Office. Please check the following websites for further information:
University Regulations Student Handbook: http://student-rules.tamu.edu
Aggie Honor System Office: http://www.tamu.edu/aggiehonor/
Definition of Academic Misconducts: http://www.tamu.edu/aggiehonor/acadmisconduct.htm
Americans with Disabilities Act (ADA) Policy Statement
The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, in Cain Hall, Room B118, or call 845-1637. For additional information visit http://disability.tamu.edu.