BMEN 4325 - Biomedical Nanotechnology
Course Syllabus

Class Time: Monday and Wednesday; 7:00 pm – 8:20 pm
Classroom: NTDP D215

Instructor: Dr. Yong Yang, Associate Professor, Department of Biomedical Engineering
Office: D110
Office Hours: Monday and Wednesday; 6 pm – 7 pm or by appointment
Phone: (940) 565-2982
Email: yong.yang@unt.edu

Course Description: This course provides an overview of nanotechnology, fabrication, characterization and functions of nanoscale structures, and serves as an introduction to major areas in biomedical sectors influenced by developments in nanotechnology. Moreover, this course provides the platform to improve the students’ oral and written communication skills.

Textbook: None required

Reference: Class notes and research pages

BioMEMS and Biomedical Nanotechnology, Volume I: Biological and Biomedical Nanotechnology; Editor-in-chief: Ferrari, Mauro; Lee, Abraham P.; Lee, James (Eds.), 1 edition, Springer (2006)

Course Objectives: BMEN 4325 addresses the following ABET program outcomes: 1) Apply knowledge of mathematics, engineering and science; 2) Communicate effectively; 3) A knowledge of contemporary issues; and 4) Use the techniques, skills, and modern engineering tools necessary for engineering practice

By the end of this course, students will be able to:
1. Understand novel function resulted from the nanoscale structures using scientific and technological principles
2. Gain knowledge of various nanoscale fabrication and characterization techniques
3. Appraise the unique elements of nanostructured materials for biomedical applications
4. Assess the present and ever-developing state-of-art biomedical nanotechnology in the areas of tissue engineering, and stem cell research by considering the elements unique to nanostructured materials, nanostructures, nanofabrication techniques, and cell behavior

Grading Policies:

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<tr>
<th>Component</th>
<th>Percentage</th>
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<tr>
<td>Attendance</td>
<td>10%</td>
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<tr>
<td>Homework</td>
<td>45%</td>
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<tr>
<td>Laboratory Activities @ 5% each</td>
<td>10%</td>
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<tr>
<td>Term Paper</td>
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<td><strong>Total</strong></td>
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A – 85-100%
B – 75-84%
C – 65-74%
D – 55-64%
F - < 54%

Topics Covered in the Class:
1. Introduction to Biomedical Nanotechnology
2. Introductory Nanotechnology
3. Nanoscale Structures and Functions
4. Nanofabrication
5. Cell-matrix Interactions
6. Nanoscale Characterization
7. Polymer Nanoscale Science and Engineering
8. Cell Encapsulation
9. Nanotechnology in Regenerative Medicine
10. Nanotechnology in Tissue Engineering
11. Nanotechnology in Cell Engineering
12. Nanotechnology in Cancer Research
13. Nanotechnology in Drug Delivery
14. Nanotechnology in Imaging and Diagnostics

Lab demonstrations:
1. Soft lithography and Nanoimprint Lithography
2. Cellular response to micro-/nanotopography

Evaluation of term papers:
1. Follow the guideline (10 points)
2. Clear structure/organization of the paper (10 points)
3. Clear review of the background and the existing problems (5 points)
5. Clear description of the current solutions (5 points)
6. Clear idea on what the future work will be (5 points)

Additional Comments:
- Students are expected to read materials assigned thoroughly and search related literatures using PubMed and Google Scholar.
- Students are encouraged to discuss class material and homework in order to better understand concepts. However, all the homework you submit must be of your own. Direct copying of a solution (from a friend or a book) will be considered as plagiarism and a violation of the University Honor Code.
- Homework assignments are to be turned at the beginning of the class on the due date. Late submission (homework and project) will not be accepted.
- All students are responsible for announcements made in lecture on the student access website or via the class email list.
**Withdraws:** Note that students wishing to drop the course must take appropriate action (Details can be found in the following link: [http://esse.unt.edu/registrar/schedule/withdraw.html](http://esse.unt.edu/registrar/schedule/withdraw.html)). It is your responsibility to make sure all of the requisite paperwork is submitted. Ceasing attendance does not automatically drop you from the course.

**Americans with Disabilities Act:** The University of North Texas does not discriminate on the basis of an individual’s disability and complies with Section 504 and Public Law 101-336 (Americans with Disabilities Act) in its admissions, accessibility, treatment, and employment of individuals in its programs and activities. A copy of the College of Engineering ADA Compliance Document is available in the Dean’s Office. *It is the responsibility of the student to inform the instructor of any disabling condition that will require modifications by the 12th class day.*