

**MSE 4390-004 / 5390-003**  
**Nanobiotechnology**  
Fall 2015

Instructor: Kyungsuk Yum  
Nedderman Hall (NH) 203  
Monday 4:00–6:50 pm

**Instructor**

Kyungsuk Yum, Materials Science and Engineering  
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Office hours: After class, by appointment, and as announced in class

**Time and Place of Class Meetings:** Monday 4:00–6:50 pm, Nedderman Hall (NH) 203

**Description of Course Content:** The objective of this course is to provide students with the fundamental principles of physical and biological sciences at the nanoscale and the basic concepts of applying such interdisciplinary principles to develop new technologies for improving human life and health. The first part of this course introduces the fundamental principles of physics, chemistry, and biology at the nanoscale and the basic techniques to generate, manipulate, and characterize man-made and nature's nanomaterials and systems. The second part of this course covers the state-of-the-art applications of nanobiotechnology, with emphasis on biomedical applications.

**Required Textbooks and Other Course Materials:** No textbook for this course

Reference: Harry F. Tibbals, *Medical Nanotechnology and Nanomedicine*, CRC Press

\* *Reading assignments and supplementary papers are suggested as additional study material for each lecture.*

**Descriptions of Major Assignments and Examinations:** A midterm and final exam will be given. The midterm will be one hour long and held during class after Lecture 6 (the week before Spring break). The final will be one hour long and held during the final examination period. Exams are closed-book. There will be no makeup exams: If you have a valid reason for missing an exam, I will work with you to reach an acceptable time to take the exam. Cases will be dealt with on a case-by-case process. Exams will include questions that ask various concepts discussed in lectures, student presentations, and reading assignments. Exams may also include analytical problems discussed in the class. There will be a review session or office hour before the exams.

No homework assignment for this course. There will be a student presentation that reviews recent papers related to the topics discussed in each lecture after midterm (30 minute presentation and 20 minute discussion, individual presentation). There will be a final team project: final report and presentation (team of 2 or 3 students). The final report will be limited to 5 pages (2–4 pages recommended), excluding references. The final project is intended to propose new ideas for fundamental or applied research in any areas of nanobiotechnology: (i) discover new knowledge (e.g., experimental designs) or (ii) develop new materials, devices, and systems to improve human life and health. The topic of the final project should be decided by April 7 (Lecture 11). Details of the final report and presentation will be discussed in class before the midterm.

**Attendance:** At The University of Texas at Arlington, taking attendance is not required. Rather, each faculty member is free to develop his or her own methods of evaluating students' academic performance, which includes establishing course-specific policies on attendance. As the instructor of this section, I will factor attendance into the grade (20%) as follows: A (full credit) 0-1, B 2-3, C 4-5, D

6-7, F (no credit) > 7 unexcused absences. If you have a real excuse, you must notify me via email (preferably in advance).

**Grading:** Midterm exam 30%, Presentation 20%, Final team project (report and presentation): 30%, Class participation and attendance 20%

**Make-up Exams:** Make-up exams will not be provided unless special circumstances warrant.

**Drop Policy:** Students may drop or swap (adding and dropping a class concurrently) classes through self-service in MyMav from the beginning of the registration period through the late registration period. After the late registration period, students must see their academic advisor to drop a class or withdraw. Undeclared students must see an advisor in the University Advising Center. Drops can continue through a point two-thirds of the way through the term or session. It is the student's responsibility to officially withdraw if they do not plan to attend after registering. **Students will not be automatically dropped for non-attendance.** Repayment of certain types of financial aid administered through the University may be required as the result of dropping classes or withdrawing. For more information, contact the Office of Financial Aid and Scholarships (<http://www.uta.edu/aao/fao/>).

**Americans with Disabilities Act:** The University of Texas at Arlington is on record as being committed to both the spirit and letter of all federal equal opportunity legislation, including the *Americans with Disabilities Act (ADA)*. All instructors at UT Arlington are required by law to provide "reasonable accommodations" to students with disabilities, so as not to discriminate on the basis of that disability. Any student requiring an accommodation for this course must provide the instructor with official documentation in the form of a letter certified by the staff in the Office for Students with Disabilities, University Hall 102. Only those students who have officially documented a need for an accommodation will have their request honored. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at [www.uta.edu/disability](http://www.uta.edu/disability) or by calling the Office for Students with Disabilities at (817) 272-3364.

**Title IX:** The University of Texas at Arlington is committed to upholding U.S. Federal Law "Title IX" such that no member of the UT Arlington community shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity. For more information, visit [www.uta.edu/titleIX](http://www.uta.edu/titleIX).

**Academic Integrity:** Students enrolled all UT Arlington courses are expected to adhere to the UT Arlington Honor Code:

*I pledge, on my honor, to uphold UT Arlington's tradition of academic integrity, a tradition that values hard work and honest effort in the pursuit of academic excellence.*

*I promise that I will submit only work that I personally create or contribute to group collaborations, and I will appropriately reference any work from other sources. I will follow the highest standards of integrity and uphold the spirit of the Honor Code.*

UT Arlington faculty members may employ the Honor Code as they see fit in their courses, including (but not limited to) having students acknowledge the honor code as part of an examination or requiring students to incorporate the honor code into any work submitted. Per UT System *Regents' Rule* 50101, §2.2, suspected violations of university's standards for academic integrity (including the Honor Code) will be referred to the Office of Student Conduct. Violators will be disciplined in accordance with University policy, which may result in the student's suspension or expulsion from the University.

**Electronic Communication:** UT Arlington has adopted MavMail as its official means to communicate with students about important deadlines and events, as well as to transact university-related business regarding financial aid, tuition, grades, graduation, etc. All students are assigned a MavMail account and are responsible for checking the inbox regularly. There is no additional charge to students for using

this account, which remains active even after graduation. Information about activating and using MavMail is available at <http://www.uta.edu/oit/cs/email/mavmail.php>.

**Student Feedback Survey:** At the end of each term, students enrolled in classes categorized as “lecture,” “seminar,” or “laboratory” shall be directed to complete an online Student Feedback Survey (SFS). Instructions on how to access the SFS for this course will be sent directly to each student through MavMail approximately 10 days before the end of the term. Each student’s feedback enters the SFS database anonymously and is aggregated with that of other students enrolled in the course. UT Arlington’s effort to solicit, gather, tabulate, and publish student feedback is required by state law; students are strongly urged to participate. For more information, visit <http://www.uta.edu/sfs>.

**Final Review Week:** A period of five class days prior to the first day of final examinations in the long sessions shall be designated as Final Review Week. The purpose of this week is to allow students sufficient time to prepare for final examinations. During this week, there shall be no scheduled activities such as required field trips or performances; and no instructor shall assign any themes, research problems or exercises of similar scope that have a completion date during or following this week *unless specified in the class syllabus*. During Final Review Week, an instructor shall not give any examinations constituting 10% or more of the final grade, except makeup tests and laboratory examinations. In addition, no instructor shall give any portion of the final examination during Final Review Week. During this week, classes are held as scheduled. In addition, instructors are not required to limit content to topics that have been previously covered; they may introduce new concepts as appropriate.

**Emergency Exit Procedures:** Should we experience an emergency event that requires us to vacate the building, students should exit the room and move toward the nearest exit. When exiting the building during an emergency, one should never take an elevator but should use the stairwells. Faculty members and instructional staff will assist students in selecting the safest route for evacuation and will make arrangements to assist individuals with disabilities.

**Student Support Services:** UT Arlington provides a variety of resources and programs designed to help students develop academic skills, deal with personal situations, and better understand concepts and information related to their courses. Resources include tutoring, major-based learning centers, developmental education, advising and mentoring, personal counseling, and federally funded programs. For individualized referrals, students may visit the reception desk at University College (Ransom Hall), call the Maverick Resource Hotline at 817-272-6107, send a message to [resources@uta.edu](mailto:resources@uta.edu), or view the information at [www.uta.edu/resources](http://www.uta.edu/resources).

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| <p><b>Emergency Phone Numbers:</b> In case of an on-campus emergency, call the UT Arlington Police Department at <b>817-272-3003</b> (non-campus phone), <b>2-3003</b> (campus phone). You may also dial 911.</p> |
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**Course Schedule**  
**Nanobiotechnology**  
(MSE 4390-004 / 5390-003)

| Date   | Lecture  | Lecture Title   | Key Dates        |
|--------|----------|---|------------------|
| Aug 31 | 1        | Course Introduction:<br>What is Nanobiotechnology?  |                  |
| Sep 7  | No Class | No Class Meeting<br>Labor Day   |                  |
| Sep 14 | 2        | Review: Physics, Chemistry, and Biology at the Nanoscale                                  |                  |
| Sep 21 | 3        | Man-Made and Nature's Nanostructures  |                  |
| Sep 28 | 4        | Generation of Nano-Biomaterials and Systems   |                  |
| Oct 5  | 5        | Characterization and Manipulation of Nano-Biomaterials and Systems                        |                  |
| Oct 12 | 6        | Nano-Bio Mechanics / Fluidics   |                  |
| Oct 19 | 7        | Discussion of presentation and final projects<br>Midterm Exam                             |                  |
| Oct 26 | 8        | Nanobiotechnology: Imaging and Drug Delivery  | Presentation     |
| Nov 2  | 9        | Nanobiotechnology: Diagnosis and Medical Monitoring                                       | Presentation     |
| Nov 9  | 10       | Nanotechnology-based Devices for Biology and Medicine / Biologically-inspired Nanodevices | Presentation     |
| Nov 16 | 11       | Nano–Bio Interfaces: Tissue Engineering and Neural Interfaces                             | Presentation     |
| Nov 23 | 12       | Micro/Nanofluidics for Biomedicine  | Presentation     |
| Nov 30 | 13       | Nanomedicine / Nanotoxicology   | Presentation     |
| Dec 7  | 14       | Final Presentations   | Final report due |

\* Guest lecturers may be invited.

*As the instructor for this course, I reserve the right to adjust this schedule in any way that serves the educational needs of the students enrolled in this course. – K. Yum*