COURSE ANNOUNCEMENT
PSL-7215    NanoBioScience

Winter Semester - 2017 (Jan. 09 – May 1)
Class days, time, and location: Monday, 2:30-5:00pm, 5364 Scott Hall
3 Credit Hours
CRN # 21775
Prerequisites: Graduate standing or Consent of Instructor

Course Director: Bhanu P. Jena, Ph.D., D.Sc.
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Course Description: One nanometer is 1/1,000,000,000th of a meter, and capable of accommodating within this space approximately 3 linearly arranged atoms. Nature, the master engineer has designed and developed the ultimate machine, the fundamental unit of life the Cell. NanoBioScience has emerged as the next frontier science, aimed at understanding cellular processes occurring at the nanoscale. Understanding how cells and biomolecules function, in both temporal and spatial dimension at the atomic level and in real time, will ultimately provide the basis for the design and development of nanoscale devices, help in discovery and development of smart drugs and drug delivery systems, and direct and facilitate the development and growth of future biotechnologies. The impact of NanoBioScience in biology & medicine is profound. Hence, novel tools and technologies used in the study of NanoBioScience, and new discoveries and developments made in the field, will be the focus of this course.

Figure ‘Porosomes’ - the secretory nanoportal at the cell plasma membrane in pancreatic acinar cells and at the nerve terminal. (A) AFM micrograph depicting ‘pits’ and ‘porosomes’ within at the apical plasma membrane in a live pancreatic acinar cell. (B) To the right is a schematic drawing depicting porosomes at the cell plasma membrane (PM), where membrane-bound secretory vesicles called zymogen granules (ZG) dock and fuse to release intravesicular contents. (C) A high resolution AFM micrograph showing a single pit with four 100-180 nm porosomes within. (D) An electron micrograph depicting a porosome (red arrowhead) close to microvilli (MV) at the apical plasma membrane (PM) of a pancreatic acinar cell. Note the association of the porosome membrane (yellow arrowhead), and the zymogen granule membrane (ZGM) (red arrow head) of a docked ZG (inset). Cross section of a circular complex at the mouth of the porosome is seen. (E) The bottom left panel shows an electron micrograph of a porosome at the nerve terminal, in association with a synaptic vesicle (SV) at the presynaptic membrane (Pre-SM). Notice a central plug at the neuronal porosome opening. (F) The bottom right panel is an AFM micrograph of a neuronal porosome in physiological buffer, also showing the central plug at its opening. It is believed that the central plug in neuronal porosomes may regulate its rapid close-open

**Learning Objectives:** This is an interdisciplinary course, and will be taught by both the medical school and engineering faculty. On completion of this course, students will have a general understanding of:

1. Cutting edge imaging and analysis, using atomic force microscopy, single molecular interactions and dynamics,
2. Supramolecular structure-function and dynamics at nm and sub-nm resolution in real time,
3. X-ray crystallography,
4. CD spectroscopy, NMR, nanotherapeutics, targeted nano drug delivery systems,
5. Membrane biophysics, biopolymer systems, and the
6. Modeling of biological systems at the molecular level.

**Course Instructors**

1. **Dr. Bhanu P. Jena**  
   **Molecular Imaging**  
   **Jan. 09**  
   Professor,  
   Department of Physiology  
   Wayne State University School of Medicine,  
   5245 Scott Hall,  
   Detroit, MI 48201  
   Ph: 313-577-1532  
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2. **Dr. Xuequn Chen**  
   **Proteomics Mass Spectrometry**  
   **Jan 23**  
   Assistant Professor,  
   Department of Physiology  
   Wayne State University School of Medicine,  
   5215 Scott Hall,  
   Detroit, MI 48201  
   Ph: 313-577-6058  
   E-mail: xchen@med.wayne.edu

3. **Dr. Jianjun Wang**  
   **NMR**  
   **Jan 30, Feb 6**  
   Professor,  
   Department of Biochemistry & Molecular Biology  
   Wayne State University School of Medicine,  
   5105 Scott Hall,  
   Detroit, MI 48201  
   Ph: 313-577-8836  
   E-mail: jwang@med.wayne.edu
4. Dr. Timothy L. Stemmler  **Metalloprotein Dynamics**  Feb. 13  
   Professor  
   Department of Pharmaceutical Sciences  
   College of Pharmacy & Health Sciences  
   Adjunct Professor, Department of Biochemistry  
   Wayne State University School of Medicine,  
   EACPHS Room 3138  
   Detroit, MI  48201  
   Ph: 313-577-5712  
   E-mail: timothy.Stemmler@wayne.edu

5. Dr. Xiang Qiang Chu  **X-ray & Neutron Scattering**  Feb. 20  
   Assistant Professor  
   Department of Physics & Astronomy, Rm 212,  
   Wayne State University,  
   666 W. Hancock Ave.,  
   Detroit, MI  48201  
   Ph: 313-577-8962  
   E-mail: fg6486@wayne.edu

6. Dr. Jeffrey Potoff  **Atomic/Molecular Simulation**  Feb. 27  
   Professor & Associate Dean  
   Department of Chemical Engineering &  
   Material Sciences  
   Wayne State University,  
   5050 Anthony Wayne Drive,  
   Detroit, MI  48202  
   Ph: 313-577-9357  
   E-mail: ipotoff@eng.wayne.edu

7. Dr. Christopher V. Kelly  **Fluorophores/Nanoscale Imaging**  Mar 6,  
   Assistant Professor  
   Department of Physics & Astronomy  
   Wayne State University,  
   666 W. Hancock Ave.,  
   Detroit, MI  48201  
   Ph: 313-577-8471  
   E-mail: ckelley@wayne.edu

8. Dr. Korosh Torabi,  **Molecular Modeling of Protein Complex**  Mar. 20  
   Assistant Professor,  
   Department of Chemical Engineering &  
   Material Science  
   Wayne State University,  
   5050 Anthony Wayne Drive,
9. Dr. Charles W. Manke Jr, **Computer Simulations**  
   Professor & Associate Dean, College of Engineering,  
   Department of Chemical Engineering &  
   Material Science  
   Wayne State University,  
   5050 Anthony Wayne Drive,  
   Detroit, MI 48202  
   Ph: 313-577-3849  
   E-mail: cmanke@eng.wayne.edu  

   Mar. 27

10. Dr. Zhe Yang, **X-ray Crystallography**  
    Associate Professor,  
    Department of Biochemistry & Molecular Biology  
    Wayne State University School of Medicine,  
    Scott Hall,  
    Detroit, MI 48201  
    Ph: 313-577-1294  
    E-mail: zyang@med.wayne.edu  

   April 3

11. Dr. Howard Matthew, **Tissue Engineering**  
    Professor  
    Department of Chemical Engineering &  
    Material Science  
    Wayne State University,  
    5050 Anthony Wayne Drive,  
    Detroit, MI 48202  
    Ph: 313-577-5238  
    E-mail: hmatthew@eng.wayne.edu  

   April 10

12. Dr. Peter Hoffmann, **Biosensors**  
    Professor & Associate Dean  
    Department of Physics & Astronomy  
    Wayne State University,  
    666 W. Hancock Ave.,  
    Detroit, MI 48201  
    Ph: 313-577-4573  
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   Apr. 17

13. Dr. Ladislau C. Kovari, **Viral Drug Targets**  
    Professor  
    Department of Biochemistry & Molecular Biology  

   Apr. 24
Examinations and Grading Policy: There will be 20 pts for class participation and 80 pts for a 15 min final presentation followed by 5 min of questions on an topic (assigned by the course director) covered in class.

Religious Holidays (from the online Academic Calendar): Because of the extraordinary variety of religious affiliations of the University student body and staff, the Academic Calendar makes no provisions for religious holidays. However, it is University policy to respect the faith and religious obligations of the individual. Students with classes or examinations that conflict with their religious observances are expected to notify their instructors well in advance so that mutually agreeable alternatives may be worked out.

Student Disabilities Services

• (edited statement from the SDS web site): If you have a documented disability that requires accommodations, you will need to register with Student Disability Services for coordination of your academic accommodations. The Student Disability Services (SDS) office is located in the Adamany Undergraduate Library. The SDS telephone number is 313-577-1851 or 313-202-4216 (Videophone use only). Once your accommodation is in place, someone can meet with you privately to discuss your special needs. Student Disability Services' mission is to assist the university in creating an accessible community where students with disabilities have an equal opportunity to fully participate in their educational experience at Wayne State University.

• Students who are registered with Student Disability Services and who are eligible for alternate testing accommodations such as extended test time and/or a distraction-reduced environment should present the required test permit to the professor at least one week in advance of the exam. Federal law requires that a student registered with SDS is entitled to the reasonable accommodations specified in the student’s accommodation letter, which might include allowing the student to take the final exam on a day different than the rest of the class.

Academic Dishonesty -- Plagiarism and Cheating (edited statement from the DOSO’s web site): Academic misbehavior means any activity that tends to compromise the academic integrity of the institution or subvert the education process. All forms of academic misbehavior are prohibited at Wayne State University, as outlined in the Student Code of Conduct (http://www.doso.wayne.edu/student-conduct-services.html). Students who commit or assist in committing dishonest acts are subject to downgrading (to a failing grade for the test, paper, or other course-related activity in question, or for the entire course) and/or additional sanctions as described in the Student Code of Conduct.

• Cheating: Intentionally using or attempting to use, or intentionally providing or attempting to provide,
unauthorized materials, information or assistance in any academic exercise. Examples include: (a) copying from another student’s test paper; (b) allowing another student to copy from a test paper; (c) using unauthorized material such as a "cheat sheet" during an exam.

- **Fabrication**: Intentional and unauthorized falsification of any information or citation. Examples include: (a) citation of information not taken from the source indicated; (b) listing sources in a bibliography not used in a research paper.

- **Plagiarism**: To take and use another’s words or ideas as one’s own. Examples include: (a) failure to use appropriate referencing when using the words or ideas of other persons; (b) altering the language, paraphrasing, omitting, rearranging, or forming new combinations of words in an attempt to make the thoughts of another appear as your own.

- **Other** forms of academic misbehavior include, but are not limited to: (a) unauthorized use of resources, or any attempt to limit another student’s access to educational resources, or any attempt to alter equipment so as to lead to an incorrect answer for subsequent users; (b) enlisting the assistance of a substitute in the taking of examinations; (c) violating course rules as defined in the course syllabus or other written information provided to the student; (d) selling, buying or stealing all or part of an un-administered test or answers to the test; (e) changing or altering a grade on a test or other academic grade records.

**Course Drops and Withdrawals**: In the first two weeks of the (full) term, students can drop this class and receive 100% tuition and course fee cancellation. After the end of the second week there is no tuition or fee cancellation. Students who wish to withdraw from the class can initiate a withdrawal request on Pipeline. You will receive a transcript notation of WP (passing), WF (failing), or WN (no graded work) at the time of withdrawal. No withdrawals can be initiated after the end of the tenth week. Students enrolled in the 10th week and beyond will receive a grade. Because withdrawing from courses may have negative academic and financial consequences, students considering course withdrawal should make sure they fully understand all the consequences before taking this step. More information on this can be found at: [http://reg.wayne.edu/pdf-policies/students.pdf](http://reg.wayne.edu/pdf-policies/students.pdf)

**Student Services**

- The Academic Success Center (1600 Undergraduate Library) assists students with content in select courses and in strengthening study skills. Visit [www.success.wayne.edu](http://www.success.wayne.edu) for schedules and information on study skills workshops, tutoring and supplemental instruction (primarily in 1000 and 2000 level courses).

- The Writing Center is located on the 2nd floor of the Undergraduate Library and provides individual tutoring consultations free of charge. Visit [http://clasweb.clas.wayne.edu/writing](http://clasweb.clas.wayne.edu/writing) to obtain information on tutors, appointments, and the type of help they can provide.

- **Library Research Assistance**

  - Working on a research assignment, paper or project? Trying to figure out how to collect, organize and cite your sources? Wayne State librarians provide on-campus or online personalized help. Contact them at [http://library.wayne.edu/consult](http://library.wayne.edu/consult)

**Class Recordings**: Students need prior written permission from the instructor before recording any portion of this class. If permission is granted, the audio and/or video recording is to be used only for the student’s personal instructional use. Such recordings are not intended for a wider public audience, such as postings to the internet or sharing with others. Students registered with Student Disabilities Services (SDS) who wish to record class materials must present their specific accommodation to the instructor, who will subsequently comply with the request unless there is some specific reason why s/he cannot, such as discussion of confidential or protected information.