Special Topics: Nanomedicine Fall 2011
Washington University in Saint Louis, Saint Louis, MO, USA
CHEM 555 (www.chemistry.wustl.edu/courses/fall_2011/chem555)
TuTh 1:00 - 2:30 p.m.
Instructors, Professor John-Stephen A. Taylor and Dr. Monica Shokeen

Note: This course is being team taught as a distance-learning course, together with CHEM 689, offered at Texas A&M University, College Station, TX, USA, from TuTh 12:45 - 2:00 p.m. (Instructor, Professor Karen L. Wooley)

Meeting Times:

Tuesdays and Thursdays, 1:00 p.m. – 2:30 p.m.; September 1 – December 6, 2011

Meeting Location:

Lab Sciences, Rm. 201, with lectures broadcast *via* the internet

Instructors:

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Office Hours: TBA

Logistical items may be addressed *via* telephone or email communication, but for complex matters of understanding course material, please visit my office hours.

Course Catalog Title and Description:

Nanomedicine. Credit 3. This course will detail recent advances made in the field of nanotechnology, from fundamental principles to designs for medical applications. This course will provide the basic principles of nanotechnology as a foundation for the design of advanced nanostructured materials that are capable of interacting with and mediating biological processes, and will include highlights of nanomaterials that are undergoing clinical trials and/or have reached commercialization for medical applications. **Prerequisites: Basic Biology and Chemistry courses**

Textbook:

There is no assigned text for the course, rather, the information will be taught from examples of recent advances reported in the current scientific literature and/or drawn from various textbook sources.

A few reference books include:

Jain, Kewal K. The Handbook of Nanomedicine. Humana Press, 2008. ISBN-13: 978-1-6032-7318-3.

Nanomedicine Design of Particles, Sensors, Motors, Implants, Robots, and Devices. Ed. Mark J. Schulz, Vesselin N. Shanov, and Yeoheung Yun. Artech House, 2009. ISBN-13: 978-1-5969-3279-1.

Nanotechnology: Volume 5: Nanomedicine. Ed. Viola Vogel. Weinheim: Wiley-VCH Verlag GmbH & Co. KGaA, 2009. ISBN-13: 978-3-5273-1736-3.

Nanotechnology in Biology and Medicine: Methods, devices, and applications. Ed. Tuan Vo-Dinh. Boca Raton, FL: CRC Press, Taylor & Francis Group, 2007. ISBN-13: 978-0-8493-2949-4.

Tibbals, Harry F. Perspectives in Nanotechnology: Medical Nanotechnology and Nanomedicine. Ed. Gabor L. Hornyak. Boca Raton, FL: CRC Press, Taylor & Francis Group, 2011. ISBN-13: 978-1-4398-0874-0.

Grading Policy:

200 points	Oral presentations
200 points	Mini-review paper
200 points	Proposal paper

If it is necessary to change any content of this syllabus, students will be informed as soon as possible.

Each class session will include:

1) A joint, webconferenced lecture/discussion, 1:07 - 2:00 p.m. CST
2) Individual discussions or student presentations, at WU 2:00 - 2:30 p.m. CST; at TAMU 12:45 - 1:00 p.m. CST

Lecture #/Date	Topic	Lecturer
1/Th, September 1	Concepts of nanomedicine and funding programs to promote nanomedicine developments	Dr. Mahmoud Elsabahy, Texas A&M University
2/Tu, September 6	Concepts of nanomedicine	Professor John Taylor, Washington University
3/Th, September 8	Classes of nanostructures--biological	Professor John Taylor, Washington University
4/Tu, September 13	Classes of nanostructures--biological	Professor John Taylor, Washington University
5/Th, September 15	Classes of nanostructures--synthetic	Dr. Mahmoud Elsabahy, Texas A&M University
6/Tu, September 20	Classes of nanostructures—synthetic and characterization of synthetic nanoparticles	Professor Karen Wooley, Texas A&M University
7/Th, September 22	Drug delivery imaging systems at the Karolinska Institutet	Professor Andreas Nyström, Karolinska Institutet
8/Tu, September 27	Introduction to nanotechnology in diagnostics—*in vitro and in vivo*	Dr. Monica Shokeen, Washington University
9/Th, September 29	Introduction to imaging and comparisons of various imaging techniques	Dr. Monica Shokeen, Washington University
10/Tu, October 4	PET and microPET imaging	Professor Michael Welch, Washington University
11/Th, October 6	Nanoparticles-based optical imaging of cells and tissues	Professor Samuel Achilefu, Washington University
12/Tu, October 11	The art of falling apart & coming together: Exploiting nanomaterial properties for medicine	Professor Adah Almutairi, University of California, San Diego
13/Th, October 13	Nuclear imaging with nanoparticles	Professor Suzanne Lapi, Washington University
14/Tu, October 18	Fundamentals of optically-active nanoparticles	Professor Mikhail Berezin, Washington University
15/Th, October 20	Antisense-based (nucleic acid- or gene-based) imaging—PET, FRET and other modalities	Professor John Taylor, Washington University

16/Tu, October 25	Multi-modal imaging/theranostic nanosystems	Dr. Monica Shokeen, Washington University
17/Th, October 27	Multifunctional nanoparticles. What can we learn from nature's own nanoparticles?	Professor Willem Mulder, Mount Sinai School of Medicine
18/Tu, November 1	Cardiovascular biology and potential applications of nanotechnology	Professor Dana Abendschein, Washington University
Tu, November 1, Mini-review paper due		
19/Th, November 3	Engineering molecular imaging probes for cardiovascular disease studies	Professor Gang Bao, Georgia Institute of Technology
20/Tu, November 8	Control of nanoscale structure and functional groups for viable polymer-based drugs	Professor Craig Hawker, University of California, Santa Barbara
21/Th, November 10	NPR-C as a novel target for atherosclerosis imaging using nanoparticle probes	Professor Pamela Woodard, Washington University
22/Tu, November 15	The importance of size and shape of polymeric drug carriers for chemotherapy	Professor Jean Fréchet, University of California, Berkeley and King Abdullah University of Science and Technology
23/Th, November 17	Nanomaterials in the imaging and therapy of thrombosis	Professor Jason McCarthy, Harvard Medical School and Massachusetts General Hospital
24/Tu, November 22	Nanoparticles for the treatment of lung infectious diseases and/or acute lung injury	Professor Karen Wooley, Texas A&M University
Th, November 24	No class—Thanksgiving Break	
Tu, November 29	Student presentations of proposals	
Tu, November 29, Proposal paper due, w/5-10 minute presentation per student on Nov 29 and Dec 1		
Th, December 1	Student presentations of proposals	
25/Tu, December 6	Development of clinical nanomaterials for non-cancer diseases	Professor Steven Brody, Washington University