

**Special Topics: Nanomedicine**  
**Texas A&M University, College Station, TX, USA**  
**CHEM 689**  
**TuTh 12:45 - 2:00 p.m.**  
**Fall 2011**  
**Instructor, Professor Karen L. Wooley**

*Note: This course is being team taught as a distance-learning course, together with CHEM 555, offered at Washington University in Saint Louis, Saint Louis, MO, USA, TuTh 1:00 - 2:30 p.m. (Instructors, Professor John-Stephen A. Taylor and Dr. Monica Shokeen)*

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

**Meeting Times:**

Tuesdays and Thursdays, 12:45 p.m. – 2:00 p.m.; September 1 – December 6, 2011

**Meeting Location:**

Chemistry complex, Rm. 1423, with lectures broadcast *via* the internet

<https://mir-wustl.webex.com/mir-wustl/j.php?ED=158993947&UID=481233492&PW=NNDBjNzljNjM5&RT=MIM3>

**Instructor:**

Karen L. Wooley, Ph.D., W. T. Doherty-Welch Chair in Chemistry & Professor in  
Chemical Engineering

**Office:** Chemistry complex, Rm. 1422

**Tel.:** (979) 845-4077

**Fax:** (979) 862-1137

**e-mail:** [wooley@chem.tamu.edu](mailto:wooley@chem.tamu.edu)

**website:** <http://www.chem.tamu.edu/faculty/wooley>

**Teaching Assistant:**

Ritu Shrestha

**Office:** Chemistry complex, Rm. 1426

**Tel.:** (979) 862-3083

**e-mail:** [ritu.shrestha@chem.tamu.edu](mailto:ritu.shrestha@chem.tamu.edu)

**Office Hours:**

Mondays and Wednesdays, 3:00 – 4:00 p.m.

Weekly, September 5 – December 14, 2011

Deviations from this schedule will be announced during lecture. Logistical items may be addressed *via* telephone or email communication, but for complex matters of understanding course material, please visit the office hours.

**Course Website Address:**

<http://chem.tamu.edu/rgroup/wooley/chem689>

**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:** CHEM 228 and CHEM 315, or equivalents

**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 (2 x 100 pts each)
200 points	Mini-review paper
200 points	Proposal paper

## Tentative Calendar and Topics:

*This schedule is subject to change—we will make adjustments, as needed.*

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 TAMU 12:45 - 1:00 p.m. CST;  
at WU 2:00 - 2:30 p.m. CST

Lecture #/Date	Topic	Lecturer
Tu, August 30		No class
1/Th, September 1	Concepts of nanomedicine and funding programs to promote nanomedicine developments	Dr. Mahmoud El Sabahy, 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 El Sabahy, 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— <i>in vitro</i> and <i>in vivo</i>	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
Tu, November 1, Mini-review paper due		
18/Tu, November 1	Cardiovascular biology and potential applications of nanotechnology	Professor Dana Abendschein, Washington University
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, Proposal paper due, w/5-10 minute presentation per student on Nov 29 and Dec 1		
Tu, November 29	Student presentations of proposals	
Th, December 1	Student presentations of proposals	
25/Tu, December 6 *	Development of clinical nanomaterials for non-cancer diseases	Professor Steven Brody, Washington University

\* Dates that KLW will be traveling

**Americans with Disabilities Act (ADA) Policy Statement:**

The Americans with Disabilities Act (ADA) is a federal non-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this law 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 the Disability Services Office in Cain Hall, Rm. B118 or call (979) 845-1637. For more information, visit <http://disability.tamu.edu>.

**Academic Integrity Statement and Policy:**

“An Aggie does not lie, cheat or steal, or tolerate those who do.”

<http://www.tamu.edu/aggiehonor>