

Hessen: ISU Course Outline

Nano Science

CLASS HOURS: 20 + tutorial

Lectures	9x2 hours (credited)
Tutorial	1x2 hours (not credited)
Lab visit	1x2 hours (credited)

PROFESSOR (Academic Director)

Prof. Dr. Rüdiger Faust, Professor for the Chemistry of Mesoscopic Systems at the University of Kassel, Dean of the Faculty of Mathematics and Physical Sciences, Vice-Director of CINSaT

Phone: +49 561 804 4750, r.faust@uni-kassel.de

Lecturers:

All lecturers are members of the Center for Interdisciplinary Nanostructure Science and Technology - CINSaT - of the University of Kassel.

Prof. Dr. Arno Ehresmann, Physicist, Director of CINSaT and Professor for Experimental Physics at the University of Kassel

Prof. Dr. Hartmut Hillmer, Physicist, Co-Director Institute of Nanotechnology and Analytics (INA) and Professor for Technical Electronics at the University of Kassel

Prof. Dr. Johann-Peter Reithmaier, Physicist, Co-Director Institute of Nanotechnology and Analytics (INA) and Professor for Technical Physics at the University of Kassel

Dr. habil. Cyril Popov, Physicist and Group Leader Institute of Nanotechnology and Analytics (INA) at the University of Kassel

Prof. Dr. Thomas Fuhrmann-Lieker, Chemist and Group Leader in the Section of Macromolecular Chemistry and Molecular Materials at the University of Kassel

Dr. habil. Tobat Saragi, Physical Chemist and Group Leader in the Section of Macromolecular Chemistry and Molecular Materials at the University of Kassel

Prof. Dr. Markus Maniak, Biologist, Professor of Cell Biology at the University of Kassel

1) INFORMATION ON THE COURSE CONTENT

COURSE DESCRIPTION

The study of objects at the nanoscale, a dimension 10 thousand times thinner than a human hair, is intriguing. Gold particles change color, molecules conduct electricity without loss, and biological machines enable movements and govern our sense of time. This course is designed to take a balanced approach to the nanoworld and to introduce it from physical as well as from biological and chemical points of view. Topics include inorganic nanoparticles in everyday life, modern carbon-based materials, new photonic devices for medicine, energy, and information technology.

The course is intended for students with a good foundation in the physical sciences.

LEARNING OBJECTIVES

The interdisciplinary seminar is built around a series of lectures concerned with nano sciences, delivered by professors from diverse disciplines. Students learn from and are inspired by leading academics working at the forefront of their fields. All lectures are additionally attended by a tutor who supervises the students, accompanies them on the Lab visit and helps them prepare for the final exam.

COURSE MATERIALS

There is no textbook that covers the diversity of material presented in this course. All lecturers will provide handouts to accompany their presentation. Hard copies and pdfs will be distributed at the beginning of the course.

TENTATIVE CLASS SCHEDULE

Session	Topic	Structure and Assignment given	Assignment due	Lecturer
1	Introduction to the Nanoworld	Presentation Discussion Recommendations for post-course work to reinforce understanding	Post-course work on the basis of course materials Preparation for the next session	Prof. Dr. Rüdiger Faust
2	Magnetic domains for magnetic particle transport	Presentation / Discussion / Post-course work recommendations	Post-course work / Preparation for next session	Prof. Dr. Arno Ehresmann
3	Nanophotonics for medical-, information- and energy-technology	Presentation / Discussion / Post-course work recommendations	Post-course work / Preparation for next session	Prof. Dr. Hartmut Hillmer
4	Nanostructured Semiconductors and their applications in optoelectronic devices	Presentation / Discussion / Post-course work recommendations	Post-course work / Preparation for next session	Prof. Dr. Johann-Peter Reithmaier
5	Nano- and ultrananocrystalline diamond films: Deposition, characterization and application	Presentation / Discussion / Post-course work recommendations	Post-course work / Preparation for next session	Dr. habil. Cyril Popov
6	Nanostructures in soft matters	Presentation / Discussion / Post-course work recommendations	Post-course work / Preparation for next session	Prof. Dr. Thomas Fuhrmann-Lieker
7	Carbon Nanostructures	Presentation / Discussion / Post-course work recommendations	Post-course work / Preparation for next session	Prof. Dr. Rüdiger Faust
8	Molecular Electronics	Presentation / Discussion / Post-course work recommendations	Post-course work / Preparation for next session	Dr. habil. Tobat Saragi
9	The force of biological	Presentation / Discussion / Post-course work	Post-course work /	Prof. Dr. Markus

	molecular motors	recommendations	Preparation for next session	Maniak
10	Tutorial	Review of course material	Review of course material	Dipl. NanoSc. Fabian Körte
11	Lab Visit	Exploration of the nanolab facilities at the University of Kassel	Preparation for the the exam	Dipl. NanoSc. Fabian Körte and experts on site

2) INFORMATION ON CLASS PARTICIPATION, ASSIGNMENTS AND EXAMS

ASSIGNMENTS

- Active participation in discussions, independent study

EXAMS

- Written exam

PROFESSIONALISM & CLASS PARTICIPATION

- Regular attendance in lectures and tutorial, participation in the lab visit

MISSED CLASSES

No more than 10% of the contact hours can be missed for successful completion of the class.

3) INFORMATION ON GRADING AND ECTS

ACADEMIC STANDARDS

Upon successful completion, 3 ECTS will be awarded for the class.

According to the rules of ECTS, one credit is equivalent to 25-30 hours student workload.

GRADING SCALE:

<i>Grade</i>		<i>Description</i>
<i>15 points</i>	<i>1.0</i>	<i>very good: an outstanding achievement</i>
<i>14 points</i>		
<i>13 points</i>	<i>1.3</i>	
<i>12 points</i>	<i>1.7</i>	<i>good: an achievement substantially above average requirements</i>
<i>11 points</i>	<i>2.0</i>	
<i>10 points</i>	<i>2.3</i>	
<i>9 points</i>	<i>2.7</i>	<i>satisfactory: an achievement which corresponds to average requirements</i>
<i>8 points</i>	<i>3.0</i>	
<i>7 points</i>	<i>3.3</i>	
<i>6 points</i>	<i>3.7</i>	<i>sufficient: an achievement which barely meets the requirements</i>
<i>5 points</i>	<i>4.0</i>	
<i>4 points</i>	<i>5.0</i>	<i>not sufficient / failed: an achievement which does not meet the requirements</i>
<i>3 points</i>		
<i>2 points</i>		
<i>1 point</i>		
<i>0 points</i>		

This course description was issued on: January 27, 2015. Program is subject to change.