

Class Schedule - Spring 2005

Materials Science and Engineering

100 **Materials Lectures** credit: 1 hours.

(MATSE 100) Lecture and demonstration course to introduce freshmen to the field of materials science and engineering.

CRN	Type	Section	Time	Days	Location	Instructor
38198	lecture-discussion	A	03:00 PM - 03:50 PM	MW	room 218 Ceramics Bldg	Braun, P
38201	lecture	B	07:00 AM - 07:50 AM	MW	room 218 Ceramics Bldg	Braun, P

199 **Undergraduate Open Seminar** credit: 1 to 5 hours.

(MATSE 199) May be repeated to a maximum of 5 hours. Students may register in more than one section per term.

CRN	Type	Section	Time	Days	Location	Instructor
10557	independent study		ARRANGED			
Instructor Approval Required						

206 **Mechanics for MatSE** credit: 4 hours.

(MATSE 206) Same as TAM 206. See TAM 206.

CRN	Type	Section	Time	Days	Location	Instructor
36224	lecture	AL1	11:00 AM - 12:20 PM	F	room 218 Ceramics Bldg	Keane, R
	lecture	AL1	11:00 AM - 12:50 PM	MW	room 218 Ceramics Bldg	Keane, R

280 **Intro to Eng Materials** credit: 3 hours.

(MATSE 200) Introduction to the materials science and engineering of ceramics, electronic materials, metals and polymers. Bonding; crystallography; imperfections; processing and properties of semiconductors, polymers, metals, ceramics and composites; and phase diagrams. Case studies will be used to exemplify the lecture material. Credit is not given for both MSE 280 and either TAM 324 or ME 330. Prerequisite: PHYS 212, MATH 342, and credit or registration in PHYS 214.

CRN	Type	Section	Time	Days	Location	Instructor
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38203	lecture-discussion	L	10:30 AM - 11:50 AM	TR	room 218 Ceramics Bldg	Shim, M
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304 **Electronic Properties of Matls** credit: 3 hours.

(MATSE 204) Study of the electronic structure and bonding of materials, electrical conduction in metals and semiconductors, and dielectric and magnetic properties of solids. Credit is not given for both MSE 304 and PHYS 460. (Students may substitute PHYS 460 for MSE 304 as part of the Materials Science and Engineering degree requirements) Prerequisite: PHYS 214 and junior standing in science or engineering; or consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
38206	lecture-discussion	C	10:00 AM - 10:50 AM	MWF	room 218 Ceramics Bldg	Weaver, J

308 **Materials Laboratory, II** credit: 3 hours.

(MATSE 208) Experiments characterizing mechanical, transport, and magnetic-electric properties of materials. MSE 307 and MSE 308 are approved for General Education credit only as a sequence. Both courses must be completed to receive Advanced Composition credit. Prerequisite: Completion of campus Composition I requirement; MSE 307; and credit or concurrent registration in MSE 304 and MSE 406.

This course satisfies the General Education Criteria for a Advanced Composition course.

CRN	Type	Section	Time	Days	Location	Instructor
38210	laboratory	AB1	02:00 PM - 04:50 PM	T	room 105 Ceramics Kiln House	Perecherla, R
Advanced Composition course.						
38211	laboratory	AB2	02:00 PM - 04:50 PM	W	room 105 Ceramics Kiln House	Perecherla, R
Advanced Composition course.						
38214	laboratory	AB3	02:00 PM - 04:50 PM	R	room 105 Ceramics Kiln House	Perecherla, R
Advanced Composition course.						
38208	lecture	AL1	01:00 PM - 01:50 PM	TR	room 218 Ceramics Bldg	Perecherla, R
Advanced Composition course.						

395 **Materials Design** credit: 1 hours.

(MATSE 295) Design of various engineering devices, objects or systems. Teams of 2-5 students from different concentrations within the department work toward the development of materials based solutions to problems originating from student, faculty and industrial suggestions. Projects will be guided by various faculty within

the department, with the teams presenting mid-term (oral) and final reports. Solutions are to be based on the knowledge, skills and design experience acquired in earlier course work and incorporate engineering standards and realistic constraints including most of such factors as economic; environmental; sustainability; manufacturability; ethical; health and safety; social; and political concerns. Prerequisite: MSE 422; or one of MSE 441, MSE 453, MSE 460, MSE 462, MSE 470.

CRN	Type	Section	Time	Days	Location	Instructor
38216	lecture	A	02:00 PM - 03:50 PM	F	room 218 Ceramics Bldg	Geil, P

397 **Independent Study in MatSE** credit: 1 to 4 hours.

(MATSE 296) Individual study of any topic in materials science and engineering selected by the student and conducted under the supervision of a member of the faculty May be repeated if topics vary. Prerequisite: Sophomore standing or above and consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
10559	independent study		ARRANGED			
Instructor Approval Required						

402 **Kinetic Processes in Materials** credit: 3 hours.

(MATSE 302) Studies kinetics of chemical reactions; rate equations, reaction mechanisms; transport processes; diffusion equations, atomic and molecular diffusion. Phase transformations; nucleation, crystallization, displacive, spinodal decomposition. Examines surface and interface phenomena; sintering, grain growth, recovery and recrystallization MatSE students will not receive credit for this course toward a graduate degree. Prerequisite: MSE 201 and MSE 401

CRN	Type	Section	Time	Days	Location	Instructor
38218	lecture-discussion	L	09:00 AM - 10:20 AM	TR	room 218 Ceramics Bldg	Granick, S

406 **Thermal-Mech Behavior Matls** credit: 3 hours.

(MATSE 306) Studies fundamentals of elastic, viscoelastic and plastic deformation of materials, elementary theory of statics and dynamics of dislocations; examines strengthening mechanisms and behavior of composites; fracture and fatigue behavior; fundamentals of thermal behavior: heat capacity, thermal expansion and conductivity; effects of thermal stress Credit is not given for both MSE 406 and either ME 330 or TAM 324. MatSE students will not receive credit for this course toward a graduate degree. Prerequisite: TAM 206 and MSE 301.

CRN	Type	Section	Time	Days	Location	Instructor
42994	lecture-discussion	A	ARRANGED			

(MATSE 306) Studies fundamentals of elastic, viscoelastic and plastic deformation of materials, elementary theory of statics and dynamics of dislocations; examines strengthening mechanisms and behavior of composites; fracture and fatigue behavior; fundamentals of thermal behavior: heat capacity, thermal expansion and conductivity; effects of thermal stress Course Information: Credit is not given for both MSE 406 and either ME 330 or TAM 324. MatSE students will not receive credit for this course toward a graduate degree. Prerequisite: TAM 206 and MSE 301.

38219	lecture-discussion	D	09:00 AM - 09:50 AM	MWF	room 218 Ceramics Bldg	Johnson, D
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420 **Ceramic Mats and Properties** credit: 3 hours.

(MATSE 320) Basic principles and understanding of ceramic materials and properties, emphasizing structure-property relations. Gives a fundamental appreciation of the development, use, and control of the properties of a wide variety of ceramic materials from a physico-chemical point of view Prerequisite: Junior standing in engineering, or consent of instructor

CRN	Type	Section	Time	Days	Location	Instructor
38221	lecture-discussion	B	10:30 AM - 11:50 AM	TR	room 214 Ceramics Bldg	Lewis, J

423 **Ceramic Processing Laboratory** credit: 3 hours.

(MATSE 323) Experiments and demonstrations involving a wide range of modern ceramic processing methods will be conducted to develop fundamental understanding of the relationships between raw materials, processing methods, microstructural development, and physical properties. The lab emphasizes the underlying physics and chemistry of processing, as well as designing processing routes to achieve desired material properties. Technical reports will be required. Prerequisite: MSE 421 or consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
38223	lecture	AL1	01:00 PM - 01:50 PM	MW	room 4101 Materials Science and Eng Bld	Kriven, W
Students must register for the lecture and one lab.						
38226	laboratory-discussion	AY1	02:00 PM - 04:50 PM	MW	room 203 Ceramics Kiln House	Kriven, W
38228	laboratory-discussion	AY2	02:00 PM - 04:50 PM	TR	room 203 Ceramics Kiln House	Kriven, W

442 **Metals Laboratory** credit: 3 hours.

(MATSE 342) Advanced metallurgy laboratory. Effects of heat treatment; mechanical testing, oxidation and corrosion; and metallography of selected alloys. Prerequisite: MSE 308 and MSE 440; concurrent registration in MSE 441.

CRN	Type	Section	Time	Days	Location	Instructor
38232	laboratory	AB1	02:00 PM - 03:50 PM	MW	room 204 Ceramics Kiln House	Averback, R
38231	lecture	AL1	01:00 PM - 01:50 PM	MW	room 214 Ceramics Bldg	Averback, R

443 **Design of Engineering Alloys** credit: 3 hours.

(MATSE 343) Examines the application of science and engineering principles to the design, selection and performance of engineering alloys. Studies alloy classes, design, effect of alloying elements, relation to processing variables, and structure-property relationships; design project. Prerequisite: MSE 440 or consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
38233	lecture-discussion	A	11:00 AM - 11:50 AM	MWF	room 4101 Materials Science and Eng Bld	Bellon, P

444 **Welding and Joining Processes** credit: 3 or 4 hours.

(MATSE 344) The physical principles of fusion welding; heat flow; thermal cycles; physical metallurgy and mechanical properties of welded joints; applications of welding to large structures; testing of welds; nondestructive testing; design, economics, and weld specifications; and laboratory experiments in welding. Same as CEE 400. 3 undergraduate hours. 3 or 4 graduate hours. Prerequisite: TAM 324 or TAM 206 or equivalent.

CRN	Type	Section	Time	Days	Location	Instructor
40572	lecture-discussion	A	01:00 PM - 01:50 PM	MWF	room 218 Ceramics Bldg	Lawrence, F

445 **Corrosion of Metals** credit: 3 or 4 hours.

(MATSE 345) Electrochemistry, thermodynamics, and kinetics of corrosion; behavior of ferrous and nonferrous metals; corrosion rates; corrosion control; cathodic and anodic protection; high-temperature corrosion; corrosion testing; and electrolytic machining methods. 3 undergraduate hours. 3 or 4 graduate hours.

CRN	Type	Section	Time	Days	Location	Instructor
39396	lecture-discussion	A	02:30 PM - 04:20 PM	TR	room 403B2 Engineering Hall	Altstetter, C
40669	online	ONL	ARRANGED			Altstetter, C

Academic Outreach restrictions and assessments apply, see <http://www.outreach.uiuc.edu>; Please see <http://online.engr.uiuc.edu/descriptions/spring2005.htm> for more details on this course. OnlineAO Tuition 608, AO Tuition 608, AO Fees 36, and AO Fees 36.00 dollars.

450 **Intro to Polymer Sci and Eng** credit: 3 or 4 hours.

(MATSE 350) Fundamentals of polymer science and engineering. Polymer solution properties, conformation and molecular weight characterization. Rheological and viscoelastic behavior: relaxations and transitions, rubber elasticity. Crystallinity, morphology and deformation of crystalline polymers. Blends and composites. Methods of fabrication. 3 undergraduate hours. 3 or 4 graduate hours. Prerequisite: Advanced undergraduate or graduate standing.

CRN	Type	Section	Time	Days	Location	Instructor
38243	lecture-discussion	A3	10:30 AM - 11:50 AM	TR	room 305 Materials Science and Eng Bld	Braun, P

451 **Intro to Polymer Synthesis** credit: 1 hours.

(MATSE 351) Fundamentals of polymer synthesis and configuration characterization. Examines step-growth, addition, and coordination polymerization; kinetics and molecular weight distributions. Studies co-polymers; applications of IR, NMR, and ESCA to configuration characterization Credit is not given for both MSE 451 and MSE 403. Prerequisite: Concurrent registration in MSE 450 or consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
39036	lecture-discussion	A	12:00 PM - 12:50 PM	TR	room 305 Materials Science and Eng Bld	Geil, P
Meets 18-Jan-05 - 11-Mar-05.						

452 **Polymer Laboratory** credit: 3 hours.

(MATSE 352) Polymer synthesis, characterization (molecular, thermal and structural), processing and mechanical behavior are investigated experimentally. Prerequisite: MSE 450 or consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
38253	laboratory	AB1	01:00 PM - 04:50 PM	W	room 124 Ceramics Kiln House	Rogers, J
38256	laboratory	AB2	01:00 PM - 04:50 PM	R	room 124 Ceramics Kiln House	Rogers, J
38251	lecture	AL1	02:00 PM - 03:20 PM	M	room 4101 Materials Science and Eng Bld	Rogers, J

455 **Polymer Physics** credit: 3 hours.

(MATSE 355) Techniques and applications of polymer crystal structure and morphology observation; x-ray, electron, light and neutron scattering and diffraction; light and electron microscopy. Morphology-processing property relationships of crystalline polymers, blends and copolymers; liquid, plastic and condis crystals; deformation mechanisms and orientation characterization; relaxations and transitions; crystallization theory. Prerequisite: MSE 450 or consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
38259	lecture-discussion	A	11:00 AM - 11:50 AM	MWF	room 305 Materials Science and Eng Bld	Geil, P

457 **Polymer Chemistry** credit: 3 or 4 hours.

(MATSE 357) Comprehensive overview and examination of the methods used to synthesize macromolecules. Both descriptive and mechanistic organic chemistry, as it relates to polymer synthesis, are discussed Same as CHEM 480. 3 undergraduate hours. 3 or 4 graduate hours. Prerequisite: Senior standing in MSE or Chemistry.

CRN	Type	Section	Time	Days	Location	Instructor
39037	lecture-discussion	A	09:30 AM - 10:50 AM	MW	room 4101 Materials Science and Eng Bld	Economy, J

458 **Polymer Physical Chemistry** credit: 3 or 4 hours.

(MATSE 358) Intermediate level introduction to the fundamental physical chemistry of polymer systems. Focus is on equilibrium conformation, structure, properties and phase transitions of polymer solutions, dense melts, liquid crystals, mixtures, block copolymers, surfaces and interfaces, and electronic polymers. Same as CHEM 482. 3 undergraduate hours. 3 or 4 graduate hours. Prerequisite: 400-level course in thermodynamics, statistical thermodynamics, or physical chemistry.

CRN	Type	Section	Time	Days	Location	Instructor
38260	lecture-discussion	A3	09:00 AM - 10:20 AM	TR	room 4101 Materials Science and Eng Bld	Schweizer, K

460 **Electronic Matls & Proc, I** credit: 3 hours.

(MATSE 360) Introduces senior engineers and new graduate students to the materials science, engineering, and processing of semiconductors. The structure and chemistry of semiconductors are related to the electronic and optical properties. Includes: how semiconductors are produced and how to control processing to achieve desired materials properties; how to design and produce novel materials to obtain superior performance from electronic devices Prerequisite: PHYS 214; MATH 385 or consent of instructor; MSE 304 or PHYS 460 or equivalent.

CRN	Type	Section	Time	Days	Location	Instructor
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38264	lecture-discussion	A	10:00 AM - 10:50 AM	MWF	room 106B3 Engineering Hall	Rockett, A
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462 **Electronic Materials Lab** credit: 3 hours.

(MATSE 362) Introduces seniors and new graduate students to the fabrication, analysis, and properties of thin film materials through a combination of lectures and experiments. Covers both the principles and practice of; (i) deposition of thin film materials by vacuum evaporation, sputtering and plasma assisted processes; (ii) modification of properties by thermal reaction, surface treatment, etc. ; and (iii) characterization of key properties including electrical conductivity, optical properties and stress. Methods to optimize the film microstructure and engineering properties via growth techniques are emphasized. Prerequisite: Concurrent registration in MSE 460 or consent of instructor.

Register for the Lecture, one Lab and one Lbd section.

CRN	Type	Section	Time	Days	Location	Instructor
38265	laboratory	AB1	11:00 AM - 01:50 PM	W	room 218 Ceramics Kiln House	Allen, L
38267	laboratory	AB2	11:00 AM - 01:50 PM	R	room 218 Ceramics Kiln House	Allen, L
38269	laboratory	AB3	11:00 AM - 01:50 PM	W	room 218 Ceramics Kiln House	Allen, L
38271	laboratory	AB4	11:00 AM - 01:50 PM	R	room 218 Ceramics Kiln House	Allen, L
38344	lecture	AL1	09:00 AM - 09:50 AM	TR	room 122 Ceramics Kiln House	Allen, L
38266	laboratory-discussion	AY1	02:00 PM - 04:50 PM	W	room 218 Ceramics Kiln House	Allen, L
38268	laboratory-discussion	AY2	02:00 PM - 04:50 PM	R	room 218 Ceramics Kiln House	Allen, L
38270	laboratory-discussion	AY3	02:00 PM - 04:50 PM	R	room 218 Ceramics Kiln House	Allen, L
38341	laboratory-discussion	AY4	02:00 PM - 04:50 PM	W	room 218 Ceramics Kiln House	Allen, L

473 **Biomolecular Materials Science** credit: 3 hours.

(MATSE 373) This senior course will emphasize fundamental, unifying principles in biomolecular materials science. The major classes of materials under consideration includes: nucleic acids, proteins, lipids, and sugars. Specific and non-specific interactions which govern biomolecular behavior in a wide range of contexts (ex. self-assembly, cell adhesion) will also be covered. The relation of our present state of knowledge to extant empirical evidence will be emphasized, and integrated with discussions of experimental characterization and manipulation techniques in biotechnology. A case study term project involving application of course content and expository research into current literature will be required. Prerequisite: Senior or graduate standing in engineering; or consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
38346	lecture	A	01:00 PM - 02:20 PM	TR	room 305 Materials Science and Eng Bld	Wong, G

492 **Lab Safety Fundamentals** credit: 1 hours.

(MATSE 392) Presents key aspects of laboratory setups, operating procedures and emergency preparedness measures necessary for the experimentalist at UIUC, and in his/her future career Same as CHEM 494. Approved for S/U grading only. Credit earned does not count toward M.S. or Ph.D. degree in MSE.

CRN	Type	Section	Time	Days	Location	Instructor
38353	lecture	A	07:00 PM - 08:50 PM	MW	room 228 Natural History Bldg	Shang, J
Meets 28-Mar-05 - 13-Apr-05. THIS CLASS MEETS ONLY FIVE TIMES EACH SEMESTER. THE FIRST CLASS MEETS ON MARCH 28, 2005. THIS CLASS IS RESTRICTED TO JUNIORS, SENIORS AND GRADUATE STUDENTS IN ENGINEERING.						

497 **Independent Study in MatSE** credit: 1 to 4 hours.

(MATSE 396) Individual study of any topic in materials science and engineering under the supervision of a member of the faculty. May be repeated to a maximum of 4 hours. Prerequisite: Senior or graduate standing and consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
10601	independent study		ARRANGED			
Instructor Approval Required						

498 **Special Topics in MatSE** credit: 1 to 4 hours.

(MATSE 390) Structured presentations of new and developing areas of knowledge in materials science and engineering offered by the faculty to augment the formal courses available May be repeated. Students may register in more than one section per term. Prerequisite: Senior or graduate standing; as specified for each topic offering, see Schedule or departmental course information.

CRN	Type	Section	Time	Days	Location	Instructor
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38352	lecture-discussion	EL	10:30 AM - 11:50 AM	TR	room 4101 Materials Science and Eng Bld	Luijten, E
<p>Int. Computer Simul. Methods Topic: Introduction to Computer Simulation Methods The purpose of this course is to provide an introduction to the field of computer simulations in materials science. After a general introduction of central concepts, both the Monte Carlo method and the molecular dynamics method will be explained and illustrated by means of a number of examples. The focus of this class lies on understanding the various methods and on obtaining hands-on experience via the use of a generic molecular dynamics package. All students will have access to a special computing cluster to perform calculations with this package.</p>						

499 **Senior Thesis** credit: 1 to 5 hours.

(MATSE 299) Individual research in an area of materials science and engineering under the supervision of members of the staff. Results of research may be used for a senior (undergraduate) thesis May be repeated to a maximum of 6 hours. 1 to 5 undergraduate hours. No graduate credit. A minimum total credit of 3 undergraduate hours is required. Prerequisite: Senior standing, grade point average of 3.0 or better, and consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
10561	independent study		ARRANGED			
Instructor Approval Required						

501 **Kinetic Processes in Materials** credit: 4 hours.

(MATSE 401) Examines the fundamentals of rate processes in materials, both from a phenomenological and an atomistic point of view, with special emphasis on the kinetics of transformations and the transport of matter in solids. Prerequisite: Graduate course in statistical thermodynamics or consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
38356	lecture-discussion	A	09:00 AM - 10:20 AM	TR	room 218 Ceramics Bldg	Granick, S

522 **Ceramic Dielectrics** credit: 3 or 4 hours.

(MATSE 422) Review of fundamental properties of vector fields; consideration of the reaction of insulating solids to external electric fields in terms of dielectric theory; the properties of ceramic dielectrics including treatment of ferroelectrics in terms of present theory; and correlation of the piezoelectric properties of ferroelectric crystals and ceramics with the crystal structure, microstructure, and the ferroelectric properties. Prerequisite: Consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
39040	lecture-discussion	A	09:00 AM - 10:20 AM	TR	room 214 Ceramics Bldg	Payne, D

529 **Seminar in Ceramics** credit: 0 to 1 hours.

(MATSE 429) Seminar on current research in ceramic science and engineering; includes presentations by visiting lecturers, staff and students. May be repeated to a maximum of 4 hours. Approved for S/U grading only. Prerequisite: Graduate standing.

CRN	Type	Section	Time	Days	Location	Instructor
38358	lecture	R	02:00 PM - 03:20 PM	R	room 218 Ceramics Bldg	Payne, D

542 **Solidification Processing** credit: 4 hours.
(MATSE 452) Same as ME 550. See ME 550.

CRN	Type	Section	Time	Days	Location	Instructor
40386	lecture-discussion	G	03:00 PM - 04:50 PM	MW	room 153 Mechanical Engineering Bldg	Thomas, B

559 **Soft Materials Seminar** credit: 1 hours.
(MATSE 459) Seminar on current research in the science and engineering of soft materials; includes presentations by visiting lecturers, staff and students. May be repeated to a maximum of 4 hours. Approved for S/U grading only. Prerequisite: Graduate standing.

CRN	Type	Section	Time	Days	Location	Instructor
38361	conference	U	04:00 PM - 04:50 PM	T	room 218 Ceramics Bldg	Braun, P

564 **Vapor Phase Thin Film Growth** credit: 4 hours.
(MATSE 464) Introduction to atomic level processes occurring during vapor phase film growth. Quantitative consideration of growth mechanisms and microstructure evolution of films based on experimental results from atomic level probes, modeling and simulation. Prerequisite: MSE 500, 501, and a graduate course in solid state physics; or equivalent background. Recommended: MSE 582 or CHBE 553.

CRN	Type	Section	Time	Days	Location	Instructor
39041	lecture-discussion	A	02:30 PM - 03:50 PM	TR	room 4101 Materials Science and Eng Bld	Abelson, J

580 **Diffraction Physics of Matls** credit: 4 hours.
(MATSE 480) Quantitative treatment of the physical basis of X-ray, electron and neutron diffraction and their instrumentation and relationship to material's structural characterization. Discussion of their applications in materials science and condensed matter physics including structure of condensed matter, defects, phase transitions, disorder, surfaces and interfaces. Same as PHYS 566. Prerequisite: PHYS 436 or MSE 405, or consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
39042	lecture-discussion	A	02:00 PM - 03:20 PM	MW	room 305 Materials Science and Eng Bld	Zuo, J

582 **Surface Physics** credit: 4 hours.

(MATSE 482) Introduction to theory and experiment of atomic behavior on crystal surfaces; thermodynamics of surfaces; surface energy; diffraction and structure; gas-solid collisions; Brownian motion, diffusion, and evaporation; electron and ion emission, tunnelling; Van der Waals forces; theory of chemical interactions; and kinetics and statistics of adsorption. Same as PHYS 564. Prerequisite: MSE 501 or PHYS 560 or consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
38363	lecture-discussion	U	08:30 AM - 09:50 AM	TR	room 305 Materials Science and Eng Bld	Cahill, D

590 **Research Seminars** credit: 0 to 1 hours.

(MATSE 497) Discussions and lectures on current research under the direction of individual staff members. May be repeated. Prerequisite: Graduate standing and consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
10568	independent study		ARRANGED			
Instructor Approval Required						

591 **Lab Investigations in MatSE** credit: 0 to 8 hours.

(MATSE 491) Special investigations in materials providing an opportunity for instruction in experimental methods of research May be repeated to a maximum of 8 hours. Prerequisite: Graduate standing and consent of instructor. Available only to non-thesis students enrolled in a Master of Science Program.

CRN	Type	Section	Time	Days	Location	Instructor
10565	independent study		ARRANGED			
Instructor Approval Required						

595 **Materials Colloquium** credit: 0 to 1 hours.

(MATSE 498) Presentation of cutting edge materials research given by visiting lectures from academia as well as national and industrial research laboratories. Some of the research currently done in the Department of MatSE will also be presented. Students also meet with visitors for questions and discussion. Required of all graduate students

in the department during their first two years. May be repeated. May be repeated to a maximum of 2 hours for M. S. degree, or 4 hours for Ph. D. degree. Approved for both letter and S/U grading.

CRN	Type	Section	Time	Days	Location	Instructor
38367	lecture	H	04:00 PM - 05:20 PM	M	room 100 Materials Science and Eng Bld	Allen, L; Rogers, J

597 **Independent Study in MatSE** credit: 1 to 4 hours.

(MATSE 496) Individual study of any topic in materials science and engineering under the supervision of a member of the faculty. May be repeated to a maximum of 4 hours. Prerequisite: Graduate standing and consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
10566	independent study		ARRANGED			
Instructor Approval Required						

599 **Thesis Research** credit: 0 to 16 hours.

(MATSE 499) Individual research in specialized problems under the supervision of members of the staff. Results of research may be used for graduate thesis. May be repeated. Approved for S/U grading only.

CRN	Type	Section	Time	Days	Location	Instructor
10570	independent study		ARRANGED			
Instructor Approval Required						