

Course Schedule - Fall 2008

Chemical and Biomolecular Engineering

101 **Hidden World of Engineering** credit: 3 hours.

Tells the stories of everyday objects: bathtubs, pop cans and screws. These simple objects shape our lives, yet are engineering masterpieces. To unveil this hidden world the course uses a humanistic approach. Designed to appeal to all majors, it uses human stories - filled with failures and triumphs - to reveal the methods of engineers. The course enchants with tales of ancient steel making, today's pop cans, huge stone monuments, and salt. The course will change how a student looks at his or her world. Several sessions focus on women engineers and the environment.

This course satisfies the General Education Criteria for a Physical Sciences course.

CRN	Type	Section	Time	Days	Location	Instructor
50097	lecture-discussion	FRB	11:00 AM - 12:20 PM	TR	room 160 English Bldg	Hammack, W
50097: Physical Sciences course.						
50097: If this section is full, send your name, UIN class (fr,so,jr,sr) to hammack@netbox.com to be put on a waiting list. This section is reserved for Freshman students in the College of Business. Any exceptions to this must be approved in writing by Professor Hammack (hammack@netbox.com). Any exceptions that are not approved by him, errors in admittance, or overrides that violate the selection criteria for this section will be corrected before the semester starts. Note that all sections of this course meet at the same time.						
50101	lecture-discussion	FRF	11:00 AM - 12:20 PM	TR	room 160 English Bldg	Hammack, W
50101: Physical Sciences course.						
50101: If this section is full, send your name, UIN, class (fr,so,jr,sr) to hammack@netbox.com to be put on a waiting list. This section is reserved for Freshmen students in the College of Fine & Applied Arts. Any exceptions to this must be approved in writing by Professor Hammack (Hammack@netbox.com). Any exceptions that are not approved by him, errors in admittance, or overrides that violate the selection criteria for this section will be corrected before the semester starts. Note that all sections of this course meet at the same time.						
50099	lecture-discussion	FRL	11:00 AM - 12:20 PM	TR	room 160 English Bldg	Hammack, W
50099: Physical Sciences course.						
50099: If this section is full, send your name, UIN, class (fr,so,jr,sr) to hammack@netbox.com to be put on a waiting list. This section is reserved for Freshman students in the College of Liberal Arts and Sciences. Any exceptions to this must be approved in writing by Professor Hammack (hammack@netbox.com). Any exceptions that are not approved by him, errors in admittance, or overrides that violate the selection criteria for this section will be corrected before the semester starts. Note that all sections of this course meet at the same time.						
50098	lecture-discussion	SBU	11:00 AM - 12:20 PM	TR	room 160 English Bldg	Hammack, W
50098: Physical Sciences course.						
50098: If this section is full, send your name, UIN, class (fr,so,jr,sr) to hammack@netbox.com to be put on a waiting list. This section is reserved for Sophomore students in the College of Business. Any exceptions to this must be approved in writing by Professor Hammack (hammack@netbox.com). Any exceptions that are not approved by him, errors in admittance, or overrides that violate the selection criteria for this section will be						

corrected before the semester starts. Note that all sections of this course meet at the same time.

50100	lecture-discussion	SLA	11:00 AM - 12:20 PM	TR	room 160 English Bldg	Hammack, W
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50100: Physical Sciences course.

50100: If this section is full, send your name, UIN, class (fr,so,jr,sr) to hammack@netbox.com to be put on a waiting list. This section is reserved for Sophomore students in the College of LAS. Any exceptions to this must be approved in writing by Professor Hammack (hammack@netbox.com). Any exceptions that are not approved by him, errors in admittance, or overrides that violate the selection criteria for this section will be corrected before the semester starts. Note that all sections of this course meet at the same time.

50113	lecture-discussion	SOF	11:00 AM - 12:20 PM	TR	room 160 English Bldg	Hammack, W
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50113: Physical Sciences course.

50113: If this section is full, send your name, UIN, class (fr,so,jr,sr) to hammack@netbox.com to be put on a waiting list. This section is reserved for Sophomore students in the College of Fine & Applied Arts. Any exceptions to this must be approved in writing by Professor Hammack (hammack@netbox.com). Any exceptions that are not approved by him, errors in admittance, or overrides that violate the selection criteria for this section will be corrected before the semester starts. Note that all sections of this course meet at the same time.

199 **Undergraduate Open Seminar** credit: 1 to 5 hours.
Approve for both standard and S/U grading. May be repeated.

CRN	Type	Section	Time	Days	Location	Instructor
10480	independent study		ARRANGED			

201 **Cooperative Education Planning** credit: 0 hours.
Same as CHEM 291. See CHEM 291.

CRN	Type	Section	Time	Days	Location	Instructor
36306	discussion-recitation	1	ARRANGED			Williams, D

202 **Cooperative Education Practice** credit: 0 hours.
Same as CHEM 293. See CHEM 293.

CRN	Type	Section	Time	Days	Location	Instructor
36312	practice	1	ARRANGED			Williams, D

210 **CHBE Internship** credit: 0 hours.

Full-time practice of chemical science in an off-campus industrial setting or research laboratory environment. Summary report required. May be repeated. Approved for S/U grading. Prerequisite: Completion of freshman year or equivalent, or consent of Director of Cooperative Education in Chemical and Biomolecular Engineering.

CRN	Type	Section	Time	Days	Location	Instructor
29898	discussion-recitation	1	ARRANGED			Williams, D

221 **Principles of CHE** credit: 3 hours.

Lectures and problems on material and energy balances. Prerequisite: CHEM 104 or CHEM 204; credit or concurrent registration in CS 101.

Students must register for one lecture-discussion and one quiz section.

CRN	Type	Section	Time	Days	Location	Instructor
31555	lecture-discussion	AE1	02:00 PM - 02:50 PM	MW	room 23 Psychology Building	Kong, H
31556	quiz	AQ1	02:00 PM - 02:50 PM	F	room 211 Davenport Hall	Kong, H
31558	quiz	AQ2	02:00 PM - 02:50 PM	F	room 113 Davenport Hall	Kong, H
31559	quiz	AQ3	02:00 PM - 02:50 PM	F	room 132 Davenport Hall	Kong, H
31560	quiz	AQ4	02:00 PM - 02:50 PM	F	room 162 Noyes Laboratory	Kong, H
48021	quiz	AQ5	02:00 PM - 02:50 PM	F	room 164 Noyes Laboratory	Kong, H

297 **Individual Study Sophomores** credit: 1 to 3 hours.

Individual study of problems related to Chemical and Biomolecular Engineering. May be repeated to a maximum of 6 hours. Prerequisite: Sophomore standing and consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
50951	independent study		ARRANGED			

397 **Individual Study for Juniors** credit: 1 to 3 hours.

Individual study of problems related to Chemical and Biomolecular Engineering. May be repeated to a maximum of 6 hours. Prerequisite: Junior standing and consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
39580	independent study		ARRANGED			

421 **Momentum and Heat Transfer** credit: 4 hours.

Introduction to fluid statics and dynamics; dimensional analysis; design of flow systems; introduction to heat transfer; conduction, convection, and radiation. Prerequisite: CHBE 221 or consent of instructor.

Students must register for one discussion and one lecture section.

CRN	Type	Section	Time	Days	Location	Instructor
31561	discussion-recitation	AD1	01:00 PM - 01:50 PM	F	room 211 Davenport Hall	Higdon, J; Harley, B
31564	discussion-recitation	AD2	12:00 PM - 12:50 PM	F	room 162 Noyes Laboratory	Higdon, J; Harley, B
31566	discussion-recitation	AD3	12:00 PM - 12:50 PM	F	room 164 Noyes Laboratory	Higdon, J; Harley, B
41667	discussion-recitation	AD5	01:00 PM - 01:50 PM	F	room 113 Davenport Hall	Higdon, J; Harley, B
41708	discussion-recitation	AD6	01:00 PM - 01:50 PM	F	room 164 Noyes Laboratory	Higdon, J; Harley, B
31577	lecture	AL1	08:30 AM - 09:50 AM	TR	room 124 Burrill Hall	Higdon, J; Harley, B

430 **Unit Operations Laboratory** credit: 4 hours.

Experiments and computation in fluid mechanics, heat transfer, mass transfer, and chemical reaction engineering. Exercises in effective Chemical and Biomolecular Engineering communications. Prerequisite: CHBE 422; credit or concurrent registration in CHBE 424; senior standing in Chemical and Biomolecular Engineering.

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

CHBE 430 and CHBE 431 are approved for General Education credit only as a sequence. Both courses must be completed to receive Advanced Composition credit.

CRN	Type	Section	Time	Days	Location	Instructor
31592	laboratory	AB2	01:00 PM - 05:50 PM	T	room 8 Roger Adams Laboratory	Miletic, M
31592: Advanced Composition course.						
31595	laboratory	AB3	01:00 PM - 05:50 PM	W	room 8 Roger Adams Laboratory	Miletic, M
31595: Advanced Composition course.						
31600	laboratory	AB4	01:00 PM - 05:50	R	room 8 Roger	Miletic, M

			PM		Adams Laboratory	
31600: Advanced Composition course.						
31604	quiz	AQ1	04:00 PM - 04:50 PM	M	room 163 Noyes Laboratory	Miletic, M
31604: Advanced Composition course.						

431 **Process Design** credit: 4 hours.

Capstone design course where students apply principles from previous courses to the design of complete chemical process systems. Topics include: techniques used in the synthesis and analysis of chemical processes, process simulation and optimization, effective communication in a chemical process engineering environment. Prerequisite: CHBE 422; credit or concurrent registration in CHBE 424.

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

Registration limited to Senior Chemical Engineering Majors. CHBE 430 and CHBE 431 are approved for General Education credit only as a sequence. Both courses must be completed to receive Advanced Composition credit.

CRN	Type	Section	Time	Days	Location	Instructor
29899	conference	AC1	ARRANGED			Miletic, M
29899: Advanced Composition course.						
29900	lecture	AL1	09:00 AM - 09:50 AM	MWF	room 140 Burrill Hall	Miletic, M
29900: Advanced Composition course.						

440 **Process Control and Dynamics** credit: 3 hours.

Techniques used in the analysis of process dynamics and in the design of process control systems; includes Laplace transforms, stability analysis, and frequency response methods. Laboratory emphasizes on-line data acquisition and control. Prerequisite: CHBE 421 and senior standing in Chemical and Biomolecular Engineering; MATH 285; CS 101.

Students must register for one lab and one lecture section.

CRN	Type	Section	Time	Days	Location	Instructor
36100	lecture	AL1	11:00 AM - 11:50 AM	MWF	room 217 Noyes Laboratory	Braatz, R; Price, N

456 **Polymer Science & Engineering** credit: 3 hours.

Fundamentals of polymer science and engineering: polymerization mechanisms, kinetics, and processes; physical chemistry and characterization of polymers; polymer rheology, mechanical properties, and processing. Credit is not given for both CHBE 456 and MSE 450, or MSE 451. Prerequisite: CHBE 321; credit or concurrent registration in CHBE 421; CHEM 444.

CRN	Type	Section	Time	Days	Location	Instructor
49466	lecture	CMS	10:00 AM - 10:50 AM	MWF	room 335 Mechanical Engineering Bldg	Schroeder, C
49466: Meets with Special Topics ChBE 594 section CMS						

471 **Biochemical Engineering** credit: 3 to 4 hours.

Applications of chemical engineering principles to biological processes. Topics include enzyme mechanisms and kinetics, bioreactor design, cellular growth and metabolism, fermentation, and bioseparations. 3 undergraduate hours. 4 graduate hours. Prerequisite: Junior, senior, or graduate standing, or consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
41112	lecture	1	10:00 AM - 10:50 AM	MWF	room 333 Armory	Kraft, M
41112: 3 hours						

472 **Techniques in Biomolecular Eng** credit: 3 or 4 hours.

Study of the engineering principles that underlie many of the powerful tools in biotechnology, and addresses how scientific discoveries and engineering approaches are being used in current industrial applications. Topics addressed include: physical principles that govern self-organization and repair in biological systems; the tools that have been developed to characterize, manipulate, and quantify biomolecules; and the use of analytical tools and genetic manipulation in modern bioengineering and biotechnology applications. Same as BIOE 472. 3 undergraduate hours. 4 graduate hours. Prerequisite: CHEM 202, CHEM 203, CHEM 204 or equivalent; MATH 220 or MATH 221; PHYS 211, PHYS 214 or equivalent; MCB 450.

CRN	Type	Section	Time	Days	Location	Instructor
51298	lecture	A	10:30 AM - 11:50 AM	TR	room 229 Natural History Bldg	Leckband, D
51298: Meets with ChBE 594 Special Topics (section DEL)						

494 **Special Topics** credit: 1 to 3 hours.

Study of topics in chemical engineering; content varies from term to term. Typical topics include optimization, chemical kinetics, phase equilibrium, biochemical engineering, kinetic theory, and transport properties. May be repeated. Prerequisite: Senior standing in Chemical and Biomolecular Engineering or consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
47542	laboratory	EGS	01:00 PM - 04:50 PM	R	room 350E Noyes Laboratory	Seebauer, E
	lecture	EGS	01:00 PM - 01:50	T	room 162 Noyes	Seebauer, E

			PM		Laboratory	
: 3 hours Chemistry and Transport in Semiconductor Materials Synthesis Microelectronics Processing Lab. Junior or senior standing in chemistry, physics, or an engineering discipline.						
49468	lecture	PJK	01:00 PM - 02:20 PM	MW	room 164 Noyes Laboratory	Kenis, P
49468: 3 hours Microchemical Systems						

497 **Individual Study for Seniors** credit: 1 to 3 hours.

Individual study of problems related to Chemical and Biomolecular Engineering. 3 undergraduate hours. No graduate credit. May be repeated to a maximum of 6 hours. Prerequisite: Senior standing and consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
39629	independent study		ARRANGED			

499 **Senior Thesis** credit: 1 to 6 hours.

Limited in general to seniors in the curriculum in chemical and biomolecular engineering. Any others must have the consent of the head of the department. Each student taking the course must register in a minimum of 5 hours either in one term or divided over two terms. A maximum registration of 10 hours in two terms is permitted. In order to receive credit, a thesis must be presented by each student registered in CHBE 499. No graduate credit.

CRN	Type	Section	Time	Days	Location	Instructor
10482	independent study		ARRANGED			

521 **Applied Mathematics in CHBE** credit: 3 or 4 hours.

Development of mathematical models and a survey of modern mathematical methods currently used in the solution of chemical and biomolecular engineering problems; topics include the application of vectors and matrices, partial differential equations, numerical analysis, and methods of optimization in Chemical and Biomolecular Engineering. Prerequisite: Consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
29905	lecture	A	09:00 AM - 09:50 AM	MWF	room 243 Wohlers Hall	Rao, C

553 **Surface Chemistry** credit: 4 hours.

Introduction to the behavior of molecules adsorbed on solid surfaces; the structure of surfaces and adsorbate layers. The bonding of molecules to surfaces; adsorbate phase transitions; trapping and sticking of molecules on surfaces. An introduction to surface reactions; kinetics of surface reactions. A review of principles of chemical reactivity; reactivity trends on surfaces; prediction of rates and mechanisms of reactions on metals, semiconductors,

and insulators. Same as CHEM 586. Prerequisite: CHEM 444.

CRN	Type	Section	Time	Days	Location	Instructor
51299	lecture	A	03:00 PM - 03:50 PM	MWF	room 113 Davenport Hall	Masel, R

565 **CHBE Seminar** credit: 1 hours.

Required of all graduate students whose major is Chemical and Biomolecular Engineering. Approved for both letter and S/U grading. Prerequisite: CHBE 422.

CRN	Type	Section	Time	Days	Location	Instructor
29904	lecture-discussion	A	03:00 PM - 03:50 PM	T	room 116 Roger Adams Laboratory	Hammack, W

571 **Bioinformatics** credit: 4 hours.

Same as ANSC 543, MCB 571, and STAT 530. Prerequisite: MATH 225; MATH 241 and MATH 461; or consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
40358	lecture	A	01:00 PM - 02:20 PM	TR	room ARR Illini Hall	Ma, P

40358: Will be held in room 113 Illini Hall. Basic problems, algorithms and data analysis approaches in computational biology. Topics include sequence alignment, gene annotation, microarray analysis, transcription regulation, comparative genomics, proteomics, regulatory network, and SNP analysis. Statistical models and algorithms covered include mixture model, hidden Markov model, EM algorithm and Gibbs sampler, clustering and classification methods

593 **Individual Study** credit: 0 to 4 hours.

Study under the supervision of a staff member in areas not covered in course offerings. Approved for both letter and S/U grading. Prerequisite: Consent of the staff member under whom the study is to be made.

CRN	Type	Section	Time	Days	Location	Instructor
10484	independent study		ARRANGED			

594 **Special Topics** credit: 1 to 4 hours.

Various advanced topics; generally taken during the second year of graduate study. Typical topics include turbulence, hydrodynamic instability, process dynamics, interfacial phenomena, reactor design, cellular

bioengineering, properties of matter at high pressure, and phase transitions. May be repeated. Prerequisite: Consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
46151	lecture	CMS	10:00 AM - 10:50 AM	MWF	room 335 Mechanical Engineering Bldg	Schroeder, C
46151: 4 hours Topic: Polymer Science & Engineering. Meets with ChBE 456.						
31571	lecture	DEL	10:30 AM - 11:50 AM	TR	room 229 Natural History Bldg	Leckband, D
31571: 4 hours Topic: Techniques in Biomolecular Eng. Meets with ChBE 472						
31609	laboratory	EGS	01:00 PM - 04:50 PM	R	room 350E Noyes Laboratory	Seebauer, E
	lecture	EGS	01:00 PM - 01:50 PM	T	room 162 Noyes Laboratory	Seebauer, E
: 4 hours Topic: Chemistry and Transport in Semiconductor Materials Synthesis Microelectronics Processing Lab. Meets with CHBE 494 EGS. Junior or senior standing in chemistry, physics, or an engineering discipline.						
31570	lecture	MLK	10:00 AM - 10:50 AM	MWF	room 333 Armory	Kraft, M
31570: 4 hours Topic: Biochemical Engineering. Meets with CHBE 471.						
46979	lecture	PJK	01:00 PM - 02:20 PM	MW	room 164 Noyes Laboratory	Kenis, P
46979: 4 hours Microchemical Systems Meets with CHBE 494 PJK.						

597 **Special Problems** credit: 2 to 16 hours.

Individual work on problem-oriented projects not included in theses. This could be research, engineering design, or professional work in chemical and biomolecular engineering which has educational values. The work must be done under the supervision of a staff member with the approval of the department head. Approved for both letter and S/U grading.

CRN	Type	Section	Time	Days	Location	Instructor
10498	independent study		ARRANGED			

598 **Research Seminar** credit: 0 to 4 hours.

Discussion of recent developments of importance to different areas of chemical and biomolecular engineering research. The course is divided into a number of sections, and subject matter differs from section to section and from time to time. Approved for both letter and S/U grading. May be repeated. Prerequisite: Consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
10501	independent study		ARRANGED			

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

Candidates for the master's degree who elect research are required to write a thesis. A thesis is always required for the Doctor of Philosophy. Not all candidates for thesis work necessarily are accepted. Any student whose major is in another department must receive permission from the head of the Department of Chemical and Biomolecular Engineering to register in this course. Approved for S/U grading only.

CRN	Type	Section	Time	Days	Location	Instructor
10503	independent study		ARRANGED			