Chemistry

Chemistry  
Head of Department: Martin Gruebele  
Department Office: 107 Noyes Laboratory, 505 South Mathews, Urbana  
Phone: 333-5071  
www.chemistry.illinois.edu

CHEM 101  **Introductory Chemistry**  credit: 3 hours.

Introduction to the basic concepts and language of chemistry; lectures, discussions, and lab. Preparatory chemistry course for students who require additional background before enrolling in CHEM 102. This course has been approved for graduation credit for all students in the College of LAS. Students in other colleges should check with their college office. Additional fees may apply. See Class Schedule. Prerequisite: 2.5 years of high school mathematics, or credit or concurrent registration in MATH 012.

Students may take CHEM 101 as part of their general education sequence in physical science. Students must register for one lab-discussion and one lecture section.

This course satisfies the General Education Criteria for a:  
Nat Sci & Tech - Phys Sciences

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Nat Sci & Tech - Phys Sciences course.

Physical Sciences course. Reserved for incoming LAS freshman only.
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NatSci & Tech - Phys Sciences course.

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NatSci & Tech - Phys Sciences course.

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NatSci & Tech - Phys Sciences course.

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NatSci & Tech - Phys Sciences course.

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Nat Sci & Tech - Phys Sciences course.

Restricted to Liberal Arts & Sciences. Restricted to students with Freshman class standing. Physical Sciences course. Reserved for incoming LAS freshman only.

CHEM 101 Breakage Fee $10.00 Flat Fee.
CHEM 102  **General Chemistry I**  credit: 3 hours.

For students who have some prior knowledge of chemistry. Principles governing atomic structure, bonding, states of matter, stoichiometry, and chemical equilibrium. Credit is not given for both CHEM 102 and CHEM 202. CHEM 102 and CHEM 103 are approved for General Education credit only as a sequence. Both courses must be completed to receive Natural Science and Technology credit. Prerequisite: Credit in or exemption from MATH 012; one year of high school chemistry or equivalent. All students enrolled in CHEM 102 should also enroll in CHEM 103.
Students must register for a combination of one lecture and one quiz section beginning with the same letter.

This course satisfies the General Education Criteria for a:
Nat Sci & Tech - Phys Sciences

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Nat Sci & Tech - Phys Sciences course. 
Students registered in this AL lecture must also register for an AQ quiz section.

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Nat Sci & Tech - Phys Sciences course.

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**Nat Sci & Tech - Phys Sciences course.**
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Departmental Approval Required
Merit Workshops only. Call (217) 300-5899 for information. Concurrent enrollment for 1 hour credit in the Merit Section of CHEM 199 is required (See CHEM 199).

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Restricted to EOAP Std Ath&Affil-LAS AAP, EOP - Obligatory, Pres Award Program Recip, President's Award Honors, or AAP - Undeclared students.
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Departmental Approval Required
Merit Workshops only. Call (217) 300-5899 for information. Concurrent enrollment for 1 hour credit in the Merit Section of CHEM 199 is required (See CHEM 199).

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Nat Sci & Tech - Phys Sciences course. Students registered in this EL lecture must also register for an EQ quiz section.
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Nat Sci & Tech - Phys Sciences course.

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CHEM 103  General Chemistry Lab I  credit: 1 hours.
Laboratory studies to accompany CHEM 102. Additional fees may apply. See Class Schedule. Credit is not given for both CHEM 103 and CHEM 203. CHEM 102 and CHEM 103 are approved for General Education credit only as a sequence. Both courses must be completed to receive Natural Science and Technology credit. Prerequisite: Credit or concurrent registration in CHEM 102 is required.

CHEM 103 is the laboratory course that accompanies CHEM 102. Engineering students must obtain a dean's approval to drop this course after the second week of instruction.

This course satisfies the General Education Criteria for a:
Nat Sci & Tech - Phys Sciences

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Nat Sci & Tech - Phys Sciences course.
CHEM 103 Breakage Fee $10.00 Flat Fee.
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Nat Sci & Tech - Phys Sciences course.
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Chemistry, Fall 2017
Nat Sci & Tech - Phys Sciences course.
CHEM 103 Breakage Fee $10.00 Flat Fee.
**CHEM 103 Breakage Fee $10.00 Flat Fee.**

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**CHEM 104  General Chemistry II  credit: 3 hours.**

Lecture and discussions. Chemistry of materials, including organic and biological substances, chemical energetics and equilibrium, chemical kinetics, and electrochemistry. Credit is not given for both CHEM 104 and CHEM 204. Prerequisite: CHEM 102 or CHEM 202 or advanced placement credit for one semester of college-level chemistry.

All students enrolled in CHEM 104 should also enroll in CHEM 105. Students must register for a combination of one lecture and one quiz section beginning with the same letter. Engineering students must obtain a dean's approval to drop this course after the second week of instruction. CHEM 104 and CHEM 105 are approved for General Education credit only as a sequence. Both courses must be completed to receive Natural Science and Technology credit.

This course satisfies the General Education Criteria for a:

**Nat Sci & Tech - Phys Sciences**

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**Nat Sci & Tech - Phys Sciences course.**

Students who register for the AL1 lecture must also register for an AQ quiz section.

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**Nat Sci & Tech - Phys Sciences course.**

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**Nat Sci & Tech - Phys Sciences course.**

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Restrictions:
- Restricted to Liberal Arts & Sciences.
- Seats are reserved for LAS Access and Achievement Program students, specifically for EOP and PAP students in the college of Liberal Arts & Sciences. If you do not meet this requirement, please contact the Access and Achievement Program Office in 2002 Lincoln Hall to be placed on the waiting list.
- Restricted to EOAP Std Ath&Affil-LAS AAP, EOP - Obligatory, Pres Award Program Recip, President's Award Honors, or AAP - Undeclared students.

Departmental Approval Required
Restricted to Merit Workshop only. Call (217) 300-5899 for information. Concurrent enrollment for 1 hour credit in the Merit Section of CHEM 199 is required (See CHEM 199). Departmental Approval Required.

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Nat Sci & Tech - Phys Sciences course.
CHEM 105  **General Chemistry Lab II**  credit: 1 hours.

Laboratory studies to accompany CHEM 104. Additional fees may apply. See Class Schedule. Credit is not given for both CHEM 105 and CHEM 205. Prerequisite: CHEM 102 and CHEM 103; credit or concurrent registration in CHEM 104 is required.

CHEM 105 is the laboratory course that accompanies CHEM 104. Engineering students must obtain a dean's approval to drop this course after the second week of instruction. CHEM 104 and CHEM 105 are approved for General Education credit only as a sequence. Both courses must be completed to receive Natural Science and Technology credit.

This course satisfies the General Education Criteria for a:
Nat Sci & Tech - Phys Sciences

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Nat Sci & Tech - Phys Sciences course.

CHEM 105 Breakage Fee $10.00 Flat Fee.
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**CHEM 197 Individual Study Freshman** credit: 1 TO 2 hours.

Individual study of problems related to chemistry or research not necessarily leading to a senior thesis. May be repeated in separate terms to a maximum of 4 hours. A maximum of 2 hours may be used toward the major. A maximum of 18 hours of CHEM 197, CHEM 297, CHEM 397, CHEM 497 and/or CHEM 499 may be used toward the degree. Prerequisite: Chemistry faculty approval required to register.
CHEM 199  **Undergraduate Open Seminar**  credit: 0 TO 5 hours.
Approved for letter and S/U grading. May be repeated.

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<td>M</td>
<td>219 - Gregory Hall</td>
<td>McCarren, EStillabower, H</td>
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|        | Credit Hours: 1 hours  
Departmental Approval Required  
For ARISE Chem 101 engineering students only. |
| 49005  | Discussion/Recitation | GC      | 01:00 PM - 02:50 PM | M    | 2012 - Chemistry Annex | Kravchuk, VMcCarren, E |
|        | Credit Hours: 1 hours  
Departmental Approval Required  
Merit Workshops only. Call (217) 300-5899 for information. Concurrent enrollment for 1 hour credit in the Merit Section of CHEM 199 is required (See CHEM 199). |
| 65501  | Discussion/Recitation | I       | 09:00 AM - 10:50 AM | M    | 111 - Noyes Laboratory | McCarren, ESancho, D |
|        | Credit Hours: 1 hours  
Restricted to Division of General Studies.  
Restricted to DGS Enrichment Experience students. |
| 65502  | Discussion/Recitation | J       | 03:00 PM - 04:50 PM | M    | 19 - Noyes Laboratory | McCarren, ESancho, D |
|        | Credit Hours: 1 hours  
Restricted to Division of General Studies.  
Restricted to DGS Enrichment Experience students. |
| 47490  | Lecture-Discussion | JA      | ARRANGED -       |      |                   | Axelson, J     |
|        | Credit Hours: 2 hours  
Departmental Approval Required  
To enroll in this course students must also be enrolled in Chem 102 section AQD (36222) OR Chem 102 section AQ5 (36212). |
| 43653  | Conference       | K       | ARRANGED -       |      |                   | Huang, T       |
|        | Credit Hours: 2 hours  
Departmental Approval Required  
Students will work to administer the Kids and Chemistry Outreach program. Students will work hands-on with elementary age children as well as train their peers to work in elementary school classrooms. Students will create new curricula, improve past |
curricula, maintain the materials for the program, and share administrative duties such as scheduling classroom visits and training sessions.

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Credit Hours: 1 hours
Restricted to Liberal Arts & Sciences.
Restricted to EOAP Std Ath&Affil-LAS AAP, EOP - Obligatory, Pres Award Program Recip, or President's Award Honors students.

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Credit Hours: 1 hours
Students in Merit Workshop sections must register in 1 hour CHEM 199 credit concurrent with enrollment in the appropriate course.

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Credit Hours: 1 hours
Departmental Approval Required
Students in Merit Workshop sections must register in 1 hour CHEM 199 credit concurrent with enrollment in the appropriate course.

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Credit Hours: 1 hours
Restricted to Chemical Engineering or Chemistry or Computer Sci & Chemistry major(s).
Meets 23-Oct-17 - 13-Dec-17.
Study Skills Course for Chemistry and Chemical Engineering Majors (1 credit) A second 8-week course for new students (freshman or transfer students) that are struggling in their coursework. This course focuses solely on study skills and goal setting, specifically in the context of these majors. Students will be identified by instructors, advisors, deans and self-selection by the student.

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Credit Hours: 1 hours
Restricted to Liberal Arts & Sciences.
Seats are reserved for LAS Access and Achievement Program students, specifically for Undeclared students until August 1, and then seats will open for EOP and PAP students in the college of Liberal Arts and Sciences. If you do not meet this requirement, please contact the Access and Achievement Program Office in 2002 Lincoln Hall to be placed on the waiting list.
Restricted to EOAP Std Ath&Affil-LAS AAP, EOP - Obligatory, Pres Award Program Recip, President's Award Honors, or AAP - Undeclared students.

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Credit Hours: 1 hours
Departmental Approval Required
Students in Merit Workshop sections must register in 1 hour CHEM 199 credit concurrent with enrollment in the appropriate course.

CHEM 202 Accelerated Chemistry I credit: 3 hours.
Lectures and discussions. Beginning chemistry course for students in the chemical sciences and others with strong high school chemistry and mathematics preparation. Chemical calculations, structure, bonding and equilibrium. Credit is not given for both CHEM 202 and CHEM 102. Prerequisite: Credit or concurrent registration in MATH 220 or MATH 221; concurrent registration in CHEM 203.
Students must register for one lecture and one quiz section beginning with the same letter. Engineering students must obtain a dean's approval to drop this course after the second week of instruction.

This course satisfies the General Education Criteria for a:
Nat Sci & Tech - Phys Sciences

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Nat Sci & Tech - Phys Sciences course.

Students may not receive credit for both CHEM 102 and CHEM 202. Restricted to Chemical Engineering or Biochemistry or Chemistry major(s). Enrollment in this course will open up to all majors on the first day of classes. Students registered in this AL lecture must register for an AQ discussion section.

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Nat Sci & Tech - Phys Sciences course.

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Nat Sci & Tech - Phys Sciences course.

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Nat Sci & Tech - Phys Sciences course.

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Nat Sci & Tech - Phys Sciences course.

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Nat Sci & Tech - Phys Sciences course.

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Nat Sci & Tech - Phys Sciences course.

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Nat Sci & Tech - Phys Sciences course.

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<td>162 - Noyes Laboratory</td>
<td>Decoste, D Jorgensen, M</td>
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</tbody>
</table>
CHEM 203  Accelerated Chemistry Lab I  credit: 2 hours.
Companion laboratory course to CHEM 202. Comprehensive skills-oriented approach to learning laboratory technique and safety. Additional fees may apply. See Class Schedule. Students may receive no more than two credit hours for both this course and CHEM 103. Prerequisite: Concurrent registration or credit in CHEM 202 or consent of instructor.

Students must register for one lab and one lecture section beginning with the same letter. Engineering students must obtain a dean's approval to drop this course after the second week of instruction.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Type</th>
<th>Section</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
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</table>

Enrollment in this course will open up to all majors on the first day of classes.

Restricted to Chemical Engineering or Biochemistry or Chemistry major(s). Enrollment in this course will open up to all majors on the first day of classes. Students registered in this AL lecture must register for an AB lab section.

CHEM 203 Breakage Fee $40.00 Flat Fee.

<table>
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<th>Course Code</th>
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Enrollment in this course will open up to all majors on the first day of classes.

<table>
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Enrollment in this course will open up to all majors on the first day of classes.

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Enrollment in this course will open up to all majors on the first day of classes.

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Enrollment in this course will open up to all majors on the first day of classes.

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
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<th>Time</th>
<th>Days</th>
<th>Location</th>
<th>Instructor</th>
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<tbody>
<tr>
<td>38842</td>
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<td>Vura-Weis, J</td>
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</table>

Restricted to Chemical Engineering or Biochemistry or Chemistry major(s). Enrollment in this course will open up to all majors on the first day of classes. Students registered in this BL lecture must register for an BB lab section.

CHEM 203 Breakage Fee $40.00 Flat Fee.

CHEM 222  **Quantitative Analysis Lecture**  credit: 2 hours.

Fundamentals of quantitative analysis, chemical equilibrium and kinetics. This lecture course is intended to accompany CHEM 223. Students with credit in CHEM 222 can receive credit for CHEM 203. Prerequisite: CHEM 104 and CHEM 105 or equivalent.

<table>
<thead>
<tr>
<th>CRN</th>
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</table>

Restrictions will be lifted at 9am on April 25th, 2017.

CHEM 223  **Quantitative Analysis Lab**  credit: 2 hours.

Laboratory course covers the fundamentals of quantitative analysis, equilibrium and kinetics. Additional fees may apply. See Class Schedule. Credit is not given for both CHEM 223 and CHEM 205. Prerequisite: Credit or concurrent registration in CHEM 222.

Register for one Quiz and Laboratory combination.

<table>
<thead>
<tr>
<th>CRN</th>
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<th>Time</th>
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<tr>
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<td>Laboratory</td>
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</tbody>
</table>
Students must register for this quiz section and an AB lab section. Restrictions will be lifted at 9am on April 25th, 2017.
CHEM 223 Breakage Fee $40.00 Flat Fee.

CHEM 232  **Elementary Organic Chemistry I**  credit: 3 or 4 hours.
Presents structural and mechanistic chemistry with emphasis on applications of this material to closely related areas. For students in agricultural, nutritional and biological sciences, as well as premedical, predental, and preveterinary programs. One-term survey course; may be followed by CHEM 332. Additional fees may apply. See Class Schedule. Credit is not given for both CHEM 232 and CHEM 236. 3 hours of credit is an option for those not registered in a discussion-recitation section. 4 hours of credit requires registration in a discussion-recitation section and an online section. Prerequisite: CHEM 104 and CHEM 105, or CHEM 204.

<table>
<thead>
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Credit Hours: 4 hours
Departmental Approval Required
Reserved for students that have taken Chem 104B in Spring of 2017. This section goes with Discussion section CQA. You must register for both Lecture CL1 and Discussion section CQA.
Credit Hours: 4 hours
Departmental Approval Required
Reserved for students that have taken Chem 104B in Spring of 2017. This section goes with Discussion section CQA. You must register for both Lecture CL2 and Discussion section CQA.

<table>
<thead>
<tr>
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<th>Days</th>
<th>Location</th>
<th>Instructor</th>
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This section goes with Lecture CL1 or CL2. You must register for both this section and a Lecture section.

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
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<th>Time</th>
<th>Days</th>
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<th>Instructor</th>
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Credit Hours: 4 hours
4 credit hours Video lectures, course materials, and a discussion board will be made available online through Compass2g. Coregistration in the DQ1 discussion section is required.

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
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<th>Location</th>
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This discussion section will be conducted face-to-face in the classroom indicated above.

<table>
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<tr>
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<th>Type</th>
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<th>Time</th>
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Credit Hours: 3 hours
3 credit hours Video lectures, course materials, and a discussion board will be made available online through Compass2g. Students registered in this EL lecture do NOT register for a discussion section.

CHEM 233  Elementary Organic Chem Lab I  credit: 2 hours.
Basic laboratory techniques in organic chemistry are presented with emphasis on the separation, isolation, and purification of organic compounds. For students in agricultural science, dairy technology, food technology, nutrition, dietetics, premedical, predental, and preveterinary programs. Additional fees may apply. See Class Schedule. Credit is not given for both CHEM 233 and CHEM 237. Prerequisite: Credit or concurrent registration in CHEM 232.

Students must register for one lab and one lecture section.

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
<th>Days</th>
<th>Location</th>
<th>Instructor</th>
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<td>AB3</td>
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<tr>
<td>36326</td>
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<td>AB5</td>
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<td>Ahn, C Kell, D</td>
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<td>Days</td>
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<td>64805</td>
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</tbody>
</table>
Students must register for both a lab section and a lecture. CHEM 233 Breakage Fee $20.00 Flat Fee.

CHEM 236  **Fundamental Organic Chem I**  credit: 4 hours.
Fundamental structural, synthetic, and mechanistic organic chemistry is presented. For students whose major is chemistry or for those in the specialized curricula in chemistry or chemical engineering. The first term of a two-term integrated sequence (to be followed by CHEM 436). This lecture course is intended to accompany CHEM 237. Credit is not given for both CHEM 236 and CHEM 232. Prerequisite: CHEM 204 or CHEM 222 through CHEM 223.

Students must register for one discussion and one lecture section.

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
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<tr>
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</table>

Departmental Approval Required
Restricted to Merit Workshops only. Call 244-8279 for information. Concurrent enrollment for 1 hour credit in the Merit Section of CHEM 199 is required (See CHEM 199).
### CHEM 237 Structure and Synthesis  
credit: 2 hours.

Laboratory course introduces synthesis and the basic techniques for the separation, isolation and purification of organic and inorganic compounds. Additional fees may apply. See Class Schedule. Credit is not given for both CHEM 237 and CHEM 233. Prerequisite: Credit or concurrent registration in CHEM 236.

Students must register for one lab and one lecture section.

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
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<td>Young, J</td>
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</table>

Restrictions will be lifted at 9am on April 25th, 2017.
CHEM 293  **Cooperative Education Practice**  credit: 0 hours.
Off-campus cooperative practice of chemistry or chemical engineering in industrial or governmental facilities. Each chemistry or chemical engineering student participating in cooperative education must register for CHEM 293 for each off-campus term. Same as CHBE 202. Approved for S/U grading only. Prerequisite: Acceptance into the School of Chemical Sciences Cooperative Education Program.

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
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<tr>
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</table>

Restricted to Chemistry major(s).

CHEM 295  **Chemistry Internship**  credit: 0 hours.
Full-time practice of chemical science in an off-campus industrial setting or research laboratory environment. Summary report required. Approved for S/U grading only. May be repeated. Prerequisite: Completion of freshman year or equivalent, or consent of Director of Cooperative Education in Chemistry.

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
<th>Days</th>
<th>Location</th>
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<tbody>
<tr>
<td>29912</td>
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</table>

Restricted to Chemistry major(s).
Restricted to Chemistry majors only. Please see Patricia Simpson in 105 Noyes.

**CHEM 297  Individual Study Sophomore**  
credit: 1 TO 3 hours.  
Individual study of problems related to chemistry or research not necessarily leading to a senior thesis. May be repeated in separate terms. A maximum of 6 hours may be used toward the major. A maximum of 18 hours of CHEM 197, CHEM 297, CHEM 397, CHEM 497 and/or CHEM 499 may be used toward the degree. Prerequisite: Chemistry faculty approval required to register.

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
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</table>

Departmental Approval Required

**CHEM 312  Inorganic Chemistry**  
credit: 3 hours.  
Basic chemical bonding in molecules, introduction to symmetry, chemistry of the main group elements, coordination chemistry of the transition elements, organometallic chemistry, solid state chemistry, bioinorganic chemistry, chemistry of the lanthanide and actinide elements. Prerequisite: CHEM 232 or CHEM 236.

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
<th>Days</th>
<th>Location</th>
<th>Instructor</th>
</tr>
</thead>
</table>
| 29907 | Lecture | A       | 09:00 AM - 09:50 AM | MWF  | 161 - Noyes Laboratory | Leahy, C  
         Muhammad, S  
         Weitzel, A |

**CHEM 315  Instrumental Chem Systems Lab**  
credit: 2 hours.  
Laboratory course emphasizes the application of modern instrumental techniques for characterizing the kinetic behavior and equilibrium properties of chemical systems. Prerequisite: Either CHEM 237 or both CHEM 223 and CHEM 233.

Students must register for one lab and one quiz section.

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
<th>Days</th>
<th>Location</th>
<th>Instructor</th>
</tr>
</thead>
</table>
| 67155 | Laboratory | AB0    | 01:00 PM - 04:50 PM | W    | 463 - Noyes Laboratory | Hattfield, K  
         Leckband, D  
         Pawel, G |

Restricted to Chemical Engineering major(s).

<table>
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<th>CRN</th>
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<th>Days</th>
<th>Location</th>
<th>Instructor</th>
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</table>
| 31616 | Laboratory | AB2    | 01:00 PM - 04:50 PM | T    | 463 - Noyes Laboratory | Andersen, P  
         Esposito, A  
         Leckband, D |

Restricted to Chemistry or Computer Sci & Chemistry major(s).

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<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
<th>Days</th>
<th>Location</th>
<th>Instructor</th>
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</table>
| 31617 | Laboratory | AB3    | 01:00 PM - 04:50 PM | W    | 463 - Noyes Laboratory | Hattfield, K  
         Leckband, D  
         Pawel, G |

Restricted to Chemistry or Computer Sci & Chemistry major(s).

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<th>CRN</th>
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<th>Time</th>
<th>Days</th>
<th>Location</th>
<th>Instructor</th>
</tr>
</thead>
</table>
| 31618 | Laboratory | AB4    | 01:00 PM - 04:50 PM | R    | 463 - Noyes Laboratory | Andersen, P  
         Brier, T  
         Leckband, D |
### CHEM 317  Inorganic Chemistry Lab  credit: 3 hours.

Emphasizes modern techniques for the synthesis, purification, and characterization of inorganic and organometallic compounds. There are three components to the course: lectures on laboratory methodology and reporting, laboratory experiments, and report writing. The final third of the course is dedicated to special individualized projects. Additional fees may apply. See Class Schedule. Prerequisite: CHEM 312; completion of campus Composition I general education requirement.

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

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
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<th>Days</th>
<th>Location</th>
<th>Instructor</th>
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<tbody>
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<td>58371</td>
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<td>01:00 PM - 04:50 PM</td>
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<td>219 - Noyes Laboratory</td>
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<tr>
<td>58372</td>
<td>Laboratory</td>
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<td>R</td>
<td>219 - Noyes Laboratory</td>
<td>Anderson, N Drummond, M Najera, D</td>
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Advanced Composition course.
**CHEM 332  Elementary Organic Chem II**  credit: 4 hours.
Continuation of CHEM 232 focuses on organic chemistry and its applications to biochemistry, enzyme mechanisms and the life sciences. Credit is not given for both CHEM 332 and CHEM 436. This course should not be taken by students who have completed CHEM 236. Prerequisite: CHEM 232 and CHEM 233.

<table>
<thead>
<tr>
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<tbody>
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<td>63017</td>
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<td>Firouzbakht, A</td>
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<td>TR</td>
<td>180 - Bevier Hall</td>
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</table>

Students must register for this lecture and an online DD section.

**CHEM 397  Individual Study Junior**  credit: 1 TO 3 hours.
Individual study of problems related to chemistry or research not necessarily leading to a senior thesis. May be repeated in separate terms. A maximum of 6 hours may be used toward the major. A maximum of 18 hours of CHEM 197, CHEM 297, CHEM 397, CHEM 497 and/or CHEM 499 may be used toward the degree. Prerequisite: Chemistry faculty approval required to register

<table>
<thead>
<tr>
<th>CRN</th>
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<th>Section</th>
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<th>Days</th>
<th>Location</th>
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Departmental Approval Required
CHEM 420  **Instrumental Characterization**  credit: 2 hours.
Lecture course covers the fundamentals of instrumental characterization including: nuclear magnetic resonance spectroscopy, potentiometry, voltammetry, atomic and molecular spectroscopy, mass spectrometry, and gas and liquid chromatography. 2 undergraduate hours. 2 graduate hours. Prerequisite: CHEM 440; or credit or concurrent registration in CHEM 442; or consent of the instructor.

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
<th>Days</th>
<th>Location</th>
<th>Instructor</th>
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<td>29908</td>
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<td>MW</td>
<td>116 - Roger Adams Laboratory</td>
<td>Cornelius, R Gewirth, A Murphy, S Philip, M</td>
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</table>

Restricted to Chemical Engineering or Chemistry major(s).

CHEM 440  **Physical Chemistry Principles**  credit: 4 hours.
One-term course in physical chemistry emphasizing topics most important to students in the biological and agricultural sciences. Not open to students in the specialized curricula in chemistry and chemical engineering. Laboratory experience in this area provided by CHEM 315 to be taken preferably after CHEM 440. Same as BIOC 440. 4 undergraduate hours. 4 graduate hours. Prerequisite: CHEM 222 and CHEM 232, or equivalent; PHYS 102; and MATH 241 or equivalent calculus including partial derivatives.

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
<th>Days</th>
<th>Location</th>
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<td>165 - Noyes Laboratory</td>
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Topic: Balanced Survey

<table>
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<th>Type</th>
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<td>31626</td>
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<td>09:30 AM - 10:50 AM</td>
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<td>1092 - Lincoln Hall</td>
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</table>

Topic: Biological Perspective

CHEM 442  **Physical Chemistry I**  credit: 4 hours.
Lectures and problems focusing on microscopic properties. CHEM 442 and CHEM 444 constitute a year-long study of chemical principles. CHEM 442 focuses on quantum chemistry, atomic and molecular structure, spectroscopy and dynamics. 4 undergraduate hours. 4 graduate hours. Credit is not given for both CHEM 442 and PHYS 485. Prerequisite: CHEM 204 or CHEM 222; MATH 225 or MATH 415, and a minimal knowledge of differential equations, or equivalent; and PHYS 211, PHYS 212, and PHYS 214 or equivalent.

<table>
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<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
<th>Days</th>
<th>Location</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>31627</td>
<td>Lecture</td>
<td>A</td>
<td>09:00 AM - 09:50 AM</td>
<td>MWF</td>
<td>163 - Noyes Laboratory</td>
<td>Alvarado-Rodriguez, E Beckley, A Gopan, G Hammes-Schiffer, S Madsen, K</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
<th>Days</th>
<th>Location</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>31628</td>
<td>Lecture</td>
<td>B</td>
<td>10:00 AM - 10:50 AM</td>
<td>MWF</td>
<td>161 - Noyes Laboratory</td>
<td>Alvarado-Rodriguez, E Beckley, A Gopan, G</td>
</tr>
</tbody>
</table>
### CHEM 444  **Physical Chemistry II**  credit: 4 hours.
Continuation of CHEM 442, focusing on thermodynamics, statistical mechanics and kinetics from single molecules to the bulk, in gases and in the condensed phase. 4 undergraduate hours. 4 graduate hours. Credit is not given for CHEM 444 and MSE 401 or PHYS 427. Prerequisite: CHEM 442.

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
<th>Days</th>
<th>Location</th>
<th>Instructor</th>
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</thead>
<tbody>
<tr>
<td>29917</td>
<td>Lecture</td>
<td>A</td>
<td>10:00 AM - 10:50 AM</td>
<td>MWF</td>
<td>165 - Noyes Laboratory</td>
<td>Dani, R Woon, D</td>
</tr>
</tbody>
</table>

Credit is not given for MSE 401.

### CHEM 445  **Physical Principles Lab I**  credit: 2 hours.
Laboratory course features experiments concerning the fundamental physical nature of chemical phenomena. Experiments include infrared spectroscopy, protein folding, x-ray diffraction and laser induced fluorescence. 2 undergraduate hours. 2 graduate hours. Prerequisite: CHEM 315, and credit or concurrent registration in CHEM 444; or consent of instructor.

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
<th>Days</th>
<th>Location</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>31630</td>
<td>Laboratory</td>
<td>AB1</td>
<td>01:00 PM - 04:50 PM</td>
<td>T</td>
<td>459 - Noyes Laboratory</td>
<td>Ash, R Oldfield, E Sykes, A Wallum, A</td>
</tr>
</tbody>
</table>

Class will be held in 459 Noyes. Course meets at 1st available period in the lab (459 Noyes).

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
<th>Days</th>
<th>Location</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>31631</td>
<td>Laboratory</td>
<td>AB3</td>
<td>01:00 PM - 04:50 PM</td>
<td>R</td>
<td>459 - Noyes Laboratory</td>
<td>Ash, R Oldfield, E Sykes, A Wallum, A</td>
</tr>
</tbody>
</table>

Class will be held in 459 Noyes. Course meets at 1st available period in the lab (459 Noyes).

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
<th>Location</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>31632</td>
<td>Quiz</td>
<td>AQ1</td>
<td>ARRANGED -</td>
<td>459 - Noyes Laboratory</td>
<td>Oldfield, E</td>
</tr>
</tbody>
</table>

Class will be held in 459 Noyes.

### CHEM 447  **Physical Principles Lab II**  credit: 2 hours.
Laboratory course features advanced experiments concerning the fundamental physical nature of chemical phenomena. This course is a continuation of CHEM 445. Experiments include low-energy electron diffraction from surfaces, raman spectroscopy and ion cyclotron resonance mass spectroscopy. 2 undergraduate hours. 2 graduate hours. Prerequisite: CHEM 445 or consent of instructor.
Register for the quiz and one laboratory section.

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
<th>Days</th>
<th>Location</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>31633</td>
<td>Laboratory</td>
<td>AB1</td>
<td>01:00 PM - 04:50 PM</td>
<td>T</td>
<td>459 - Noyes Laboratory</td>
<td>Ash, R Oldfield, E Sykes, A Wallum, A</td>
</tr>
</tbody>
</table>

Class will be held in 459 Noyes. Course meets at 1st available period in the lab (459 Noyes).

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
<th>Days</th>
<th>Location</th>
<th>Instructor</th>
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<tbody>
<tr>
<td>31634</td>
<td>Laboratory</td>
<td>AB3</td>
<td>01:00 PM - 04:50 PM</td>
<td>R</td>
<td>459 - Noyes Laboratory</td>
<td>Ash, R Oldfield, E Sykes, A Wallum, A</td>
</tr>
</tbody>
</table>

Class will be held in 459 Noyes. Course meets at 1st available period in the lab (459 Noyes).

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
<th>Days</th>
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<tr>
<td>31575</td>
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<td>-</td>
<td>Oldfield, E</td>
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</tbody>
</table>

Class will be held in 459 Noyes.

**CHEM 480  Polymer Chemistry**  credit: 3 OR 4 hours.
Same as MSE 457. See MSE 457.

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
<th>Days</th>
<th>Location</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>38340</td>
<td>Lecture-Discussion</td>
<td>A</td>
<td>11:00 AM - 11:50 AM</td>
<td>MWF</td>
<td>135 - Mechanical Engineering Bldg</td>
<td>Evans, C</td>
</tr>
</tbody>
</table>

Restricted to Graduate - Urbana-Champaign.
This section is for Graduate Students only, you may choose either 3 or 4 credit hours.

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
<th>Days</th>
<th>Location</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>61142</td>
<td>Lecture-Discussion</td>
<td>B</td>
<td>11:00 AM - 11:50 AM</td>
<td>MWF</td>
<td>135 - Mechanical Engineering Bldg</td>
<td>Evans, C</td>
</tr>
</tbody>
</table>

Credit Hours: 3 hours
Restricted to Undergrad - Urbana-Champaign.
This section is for Undergraduate Students only.

**CHEM 488  Surfaces and Colloids**  credit: 3 OR 4 hours.
Same as MSE 480. See MSE 480.

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
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<th>Location</th>
<th>Instructor</th>
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</thead>
<tbody>
<tr>
<td>47808</td>
<td>Lecture</td>
<td>A</td>
<td>12:30 PM - 01:50 PM</td>
<td>TR</td>
<td>101 - Transportation Building</td>
<td>Chen, Q</td>
</tr>
</tbody>
</table>

Restricted to Graduate - Urbana-Champaign.
This section is for Graduate Students only, you may choose either 3 or 4 hours.
CHEM 492  **Special Topics in Chemistry**  credit: 1 TO 3 hours.
Open to advanced undergraduates and graduate students. Deals with subjects not ordinarily covered by regularly scheduled courses. 1 to 3 undergraduate hours. 1 to 3 graduate hours. Approved for letter and S/U grading. Prerequisite: Credit or concurrent registration in any 400-level course in chemistry.

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
<th>Days</th>
<th>Location</th>
<th>Instructor</th>
</tr>
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<tbody>
<tr>
<td>63427</td>
<td>Lecture-Discussion</td>
<td>TA</td>
<td>05:30 PM - 07:15 PM</td>
<td>W</td>
<td>1024 - Chemistry Annex</td>
<td>Girolami, G</td>
</tr>
</tbody>
</table>

Credit Hours: 1 hours
Departmental Approval Required
Professional Development for Chemists. The course will cover the topics of TA training, professional ethics, and development of non-technical skills in chemistry. The course is intended for all first-year Chemistry graduate students. Undergraduate students who are serving as TAs in the Department of Chemistry are also permitted to enroll with departmental approval.

CHEM 494  **Lab Safety Fundamentals**  credit: 1 hours.
Same as MSE 492. See MSE 492.

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
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<tbody>
<tr>
<td>38335</td>
<td>Lecture</td>
<td>A</td>
<td>07:00 PM - 08:50 PM</td>
<td>MW</td>
<td>100 - Noyes Laboratory</td>
<td>Shang, J</td>
</tr>
</tbody>
</table>

Meets 28-Aug-17 - 20-Oct-17.
Restricted to Physics or Biology or Biochemistry or Biophysics & Computnl Biology or Plant Biology or Cell and Structural Biology or Microbiology or Molecular & Integrative Physi or Chemistry or Geology or Chemical Physics or Biophysics or Molecular and Cellular Biology or Integrative Biology or Nursing-R.N. Completion (BSN) major(s). Restricted to students with Junior, Senior, or Graduate class standing.
This course is restricted to juniors, seniors and graduate students in a SCIENCE CURRICULUM. This class meets only five times each semester. Please contact the DEPT OF MATERIALS SCIENCE & ENGR, 333-1441, for assistance. ***PLEASE NOTE - THE FIRST CLASS WILL MEET ON MONDAY, SEPTEMBER 11, 2017.***

CHEM 495  **Teaching Secondary Chemistry**  credit: 4 hours.
Intended for undergraduates working toward certification to teach high school chemistry and graduate students working towards a Master's degree in the Teaching of Chemistry. Course aims to provide future teachers with hands-on experience in conducting laboratory experiments, demonstrations, and teaching strategies. 4 undergraduate hours. 4 graduate hours. Course does not count toward the eleven advanced hours in chemistry required in the specialized curriculum, nor does it apply to coursework required for the Ph.D. in Chemistry. Prerequisite: Undergraduate background in general chemistry and credit or concurrent enrollment in CI 403.

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
<th>Days</th>
<th>Location</th>
<th>Instructor</th>
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<tbody>
<tr>
<td>40172</td>
<td>Laboratory</td>
<td>AB1</td>
<td>12:00 PM - 01:50 PM</td>
<td>F</td>
<td>3007 - Chemistry Annex</td>
<td>Decoste, D</td>
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</table>
Instructor Approval Required

Students must register for both the lab section and the discussion section.

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
<th>Days</th>
<th>Location</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>40173</td>
<td>Discussion/Recitation</td>
<td>AD1</td>
<td>02:00 PM - 03:50 PM</td>
<td>W</td>
<td>164 - Noyes Laboratory</td>
<td></td>
</tr>
</tbody>
</table>

Instructor Approval Required

**CHEM 497  Individual Study Senior  credit: 1 TO 3 hours.**

Individual study of problems related to chemistry or research not necessarily leading to a senior thesis. To 3 undergraduate hours. No graduate credit. May be repeated in separate terms. A maximum of 6 hours may be used toward the major. A maximum of 18 hours of CHEM 197, CHEM 297, CHEM 397, CHEM 497 and/or CHEM 499 may be used toward the degree. Prerequisite: Chemistry faculty approval required to register.

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
<th>Days</th>
<th>Location</th>
<th>Instructor</th>
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<tbody>
<tr>
<td>54515</td>
<td>Independent Study</td>
<td></td>
<td>ARRANGED -</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

Departmental Approval Required

**CHEM 499  Senior Thesis  credit: 2 TO 6 hours.**

Research with thesis, under the direction of a senior staff member in chemistry. Normally the student takes two terms of CHEM 499 in the senior year. 2 to 6 undergraduate hours. No graduate credit. May be repeated up to 10 hours in separate terms. CHEM 499 is recommended for all those who plan to do research and graduate study and it is a prerequisite for graduation with distinction in chemistry. In the term preceding their initial enrollment, those interested in taking the course should consult with their advisers and with the graduate adviser for the area of interest in which they plan to work. A maximum of 10 hours may be counted toward graduation and a thesis must be presented for credit to be received.

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<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
<th>Days</th>
<th>Location</th>
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<tbody>
<tr>
<td>10508</td>
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<td>ARRANGED -</td>
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</tbody>
</table>

Departmental Approval Required

**CHEM 512  Advanced Inorganic Chemistry  credit: 4 hours.**

Descriptive chemistry of the main group and transition elements, reactions and reaction mechanisms of inorganic systems, and electronic structure of inorganic molecules and solids. Prerequisite: CHEM 312 or approval of instructor.

<table>
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<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
<th>Days</th>
<th>Location</th>
<th>Instructor</th>
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<tbody>
<tr>
<td>29928</td>
<td>Lecture</td>
<td>A</td>
<td>09:30 AM - 10:50 AM</td>
<td>TR</td>
<td>165 - Noyes Laboratory</td>
<td>Edmonsond, N Girolami, G</td>
</tr>
</tbody>
</table>

**CHEM 515  Inorganic Chemistry Seminar  credit: 1 hours.**

Required of all Chemistry graduate students whose area is inorganic chemistry. Prerequisite: Enrollment is allowed only by second-year graduate students who are presenting their Ph.D. literature seminar during that semester. Undergraduate students are not eligible to enroll in this course.

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
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<th>Days</th>
<th>Location</th>
<th>Instructor</th>
</tr>
</thead>
</table>
Chemistry, Fall 2017

CHEM 517  **Advanced Inorganic Chem Lab**  credit: 1 TO 3 hours.
Specialized laboratory techniques; more difficult inorganic syntheses. Prerequisite: Credit or concurrent registration in one of the lecture courses in inorganic chemistry in the 500 series.

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
<th>Days</th>
<th>Location</th>
<th>Instructor</th>
</tr>
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<tbody>
<tr>
<td>58382</td>
<td>Laboratory</td>
<td>A</td>
<td>01:00 PM - 04:50 PM</td>
<td>W</td>
<td>219 - Noyes Laboratory</td>
<td>Anderson, N Drummond, M Schwandt, W Weitzel, A</td>
</tr>
</tbody>
</table>

- Lecture: A 01:00 PM - 01:50 PM  T  165 - Noyes Laboratory

Restricted to Graduate - Urbana-Champaign.

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
<th>Days</th>
<th>Location</th>
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<tbody>
<tr>
<td>58383</td>
<td>Laboratory</td>
<td>B</td>
<td>01:00 PM - 04:50 PM</td>
<td>R</td>
<td>219 - Noyes Laboratory</td>
<td>Anderson, N Drummond, M Najera, D Weitzel, A</td>
</tr>
</tbody>
</table>

- Lecture: B 01:00 PM - 01:50 PM  T  165 - Noyes Laboratory

Restricted to Graduate - Urbana-Champaign.

CHEM 520  **Advanced Analytical Chemistry**  credit: 4 hours.
Treatment of the basic issues of importance in modern analytical chemistry. Topics include basic chemical and measurement concepts, measurement instrumentation and techniques, and principles, tools, and applications in spectroscopy, electrochemistry, separations, sensors, mass spectroscopy and surface characterization. Prerequisite: CHEM 315, CHEM 420, and CHEM 444.

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
<th>Days</th>
<th>Location</th>
<th>Instructor</th>
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</thead>
<tbody>
<tr>
<td>29935</td>
<td>Lecture</td>
<td>A</td>
<td>09:30 AM - 10:50 AM</td>
<td>TR</td>
<td>136 - Loomis Laboratory</td>
<td>Han, H Hui, J</td>
</tr>
</tbody>
</table>

CHEM 525  **Analytical Chemistry Seminar**  credit: 1 hours.
Required of all Chemistry graduate students whose area is analytical chemistry. Prerequisite: Enrollment is allowed only by second-year graduate students who are presenting their Ph.D. literature seminar during that semester. Undergraduate students are not eligible to enroll in this course.

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
<th>Days</th>
<th>Location</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>29939</td>
<td>Lecture-Discussion</td>
<td>A</td>
<td>04:00 PM - 05:50 PM</td>
<td>F</td>
<td>116 - Roger Adams Laboratory</td>
<td>Sweedler, J</td>
</tr>
</tbody>
</table>
Chemistry, Fall 2017

CHEM 532  **Physical Organic Chemistry**  credit: 4 hours.
Advanced survey of physical organic chemistry. The emphasis is on structure and bonding in organic compounds; scope of reaction mechanisms, including reactive intermediates and how these mechanisms and intermediates are studied; and writing reasonable organic reaction mechanisms. Prerequisite: CHEM 332 or CHEM 436 and one year of physical chemistry.

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
<th>Days</th>
<th>Location</th>
<th>Instructor</th>
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</thead>
<tbody>
<tr>
<td>29946</td>
<td>Lecture</td>
<td>A</td>
<td>11:00 AM - 11:50 AM</td>
<td>MWF</td>
<td>165 - Noyes Laboratory</td>
<td>Beebe, A Hull, K</td>
</tr>
</tbody>
</table>

Restricted to Graduate - Urbana-Champaign. Undergraduates need to have consent of instructor.

CHEM 534  **Advanced Organic Synthesis**  credit: 4 hours.
Advanced survey of organic chemistry with emphasis on synthesis of organic compounds. Course content includes survey of important synthetic reactions, construction of fundamental subunits and illustrations of strategy and synthetic analysis. Prerequisite: CHEM 332 or CHEM 436.

<table>
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<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
<th>Days</th>
<th>Location</th>
<th>Instructor</th>
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<tbody>
<tr>
<td>42841</td>
<td>Lecture</td>
<td>A</td>
<td>10:00 AM - 10:50 AM</td>
<td>MWF</td>
<td>162 - Noyes Laboratory</td>
<td>Delaney, C Denmark, S Sarlah, D</td>
</tr>
</tbody>
</table>

Restricted to Graduate - Urbana-Champaign. Undergraduates need to have consent of instructor. There will be eight additional 50 minute sessions on Wednesday evenings (at 6pm) throughout the semester to cover additional material. Dates are posted to the Compass webpage for this course and will also be announced on the first day of class.

CHEM 535  **Organic Chemistry Seminar**  credit: 1 hours.
Required of all Chemistry graduate students whose area is organic chemistry. Prerequisite: Enrollment is allowed only by second-year graduate students who are presenting their Ph.D. literature seminar during that semester. Undergraduate students are not eligible to enroll in this course.

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
<th>Days</th>
<th>Location</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>29949</td>
<td>Lecture-Discussion</td>
<td>A</td>
<td>04:00 PM - 05:20 PM</td>
<td>MR</td>
<td>116 - Roger Adams Laboratory</td>
<td>Mitchell, D</td>
</tr>
<tr>
<td></td>
<td>Lecture-Discussion</td>
<td>A</td>
<td>04:00 PM - 05:20 PM</td>
<td>T</td>
<td>116 - Roger Adams Laboratory</td>
<td>Mitchell, D</td>
</tr>
<tr>
<td></td>
<td>Lecture-Discussion</td>
<td>A</td>
<td>07:30 PM - 09:50 PM</td>
<td>W</td>
<td>116 - Roger Adams Laboratory</td>
<td>Mitchell, D</td>
</tr>
</tbody>
</table>

Restricted to Chemistry major(s). Restricted to Graduate - Urbana-Champaign.

CHEM 540  **Quantum Mechanics**  credit: 4 hours.
The sequence, CHEM 540 and CHEM 542, is designed to give seniors and graduate students a unified treatment of quantum mechanics and spectroscopy on an advanced level. CHEM 540 covers the principles of formalism of quantum mechanics, as well as the solution of the Schrödinger equation for models and simple chemical systems. Prerequisite: CHEM 442 or equivalent.

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
<th>Days</th>
<th>Location</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>29918</td>
<td>Lecture</td>
<td>A</td>
<td>09:30 AM - 10:50 AM</td>
<td>TR</td>
<td>164 - Noyes Laboratory</td>
<td>Daly, C Makri, N</td>
</tr>
</tbody>
</table>

CHEM 544  **Statistical Thermodynamics**  credit: 4 hours.
Fundamentals of thermodynamics and statistical mechanics, covering equilibria, thermodynamic transforms, phase transitions, ensembles and non-equilibrium statistical mechanics, from single molecules to complex biological systems. Prerequisite: CHEM 442 and CHEM 444, or equivalent.

<table>
<thead>
<tr>
<th>CRN</th>
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<th>Section</th>
<th>Time</th>
<th>Days</th>
<th>Location</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>29953</td>
<td>Lecture</td>
<td>A</td>
<td>11:00 AM - 11:50 AM</td>
<td>MWF</td>
<td>163 - Noyes Laboratory</td>
<td>Bianchi, D Luthey-Schulten, Z</td>
</tr>
</tbody>
</table>

CHEM 545  **Physical Chemistry Seminar**  credit: 1 hours.
Required of all Chemistry graduate students whose area is physical chemistry. Prerequisite: Enrollment is allowed only by second-year graduate students who are presenting their Ph.D. literature seminar during that semester. Undergraduate students are not eligible to enroll in this course.

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
<th>Days</th>
<th>Location</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>29955</td>
<td>Lecture-Discussion</td>
<td>A</td>
<td>02:00 PM - 03:20 PM</td>
<td>W</td>
<td>B102 - Chemical and Life Sci Lab</td>
<td>McCall, B</td>
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<td></td>
<td>Lecture-Discussion</td>
<td>A</td>
<td>04:00 PM - 05:20 PM</td>
<td>M</td>
<td>161 - Noyes Laboratory</td>
<td>McCall, B</td>
</tr>
</tbody>
</table>

Restricted to Chemistry or Chemical Physics major(s). Restricted to Graduate - Urbana-Champaign. The Wednesday 2:00 section of this course will be held in room B102 CLSL.

CHEM 570  **Concepts in Chemical Biology**  credit: 4 hours.
An overview of the concepts and methods utilized in research at the interface of chemistry and biology, and their application to contemporary problems in biological chemistry. Specific topics covered include, but are not limited to, chemical genetics, bioconjugation reactions, combinatorial chemistry, high-throughput screening, identifying biological targets of small-molecule compounds, combinatorial biosynthesis, sequence-specific DNA-binding compounds, activity-based protein profiling, anti-cancer agents, targeted therapeutics, phage display, and yeast-hybrid systems. Prerequisite: One year (two semesters) of undergraduate organic chemistry is required. One semester of undergraduate biochemistry or molecular biology is preferred.
For graduate students only. Well-qualified undergraduate students may enroll with consent of instructor.

<table>
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<tr>
<th>CRN</th>
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<th>Section</th>
<th>Time</th>
<th>Days</th>
<th>Location</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>60383</td>
<td>Lecture</td>
<td>A</td>
<td>08:00 AM - 09:20 AM</td>
<td>TR</td>
<td>165 - Noyes Laboratory</td>
<td>Chan, J Kelly, A</td>
</tr>
</tbody>
</table>

Not intended for Undergrad - Urbana-Champaign.
Undergrads must contact the course director before enrolling.

CHEM 575 **Chemical Biology Seminar**  credit: 1 hours.
Required of all Chemistry graduate students whose area is chemical biology. Prerequisite: Enrollment is allowed only by second-year graduate students who are presenting their Ph.D. literature seminar during that semester. Undergraduate students are not eligible to enroll in this course.

<table>
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<tr>
<th>CRN</th>
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<th>Section</th>
<th>Time</th>
<th>Days</th>
<th>Location</th>
<th>Instructor</th>
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</thead>
<tbody>
<tr>
<td>29957</td>
<td>Lecture-Discussion</td>
<td>A</td>
<td>12:00 PM - 01:50 PM</td>
<td>R</td>
<td>163 - Noyes Laboratory</td>
<td>Silverman, S</td>
</tr>
</tbody>
</table>

Restricted to Graduate - Urbana-Champaign.

CHEM 584 **Introduction to Materials Chem**  credit: 4 hours.
Processing of ceramics, metals, polymers, and semiconductors, both traditional and advanced, and their mechanical, electrical, magnetic, optical and thermal properties.

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<tr>
<th>CRN</th>
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<th>Section</th>
<th>Time</th>
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<th>Location</th>
<th>Instructor</th>
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</thead>
<tbody>
<tr>
<td>46582</td>
<td>Lecture</td>
<td>A</td>
<td>08:00 AM - 09:20 AM</td>
<td>TR</td>
<td>161 - Noyes Laboratory</td>
<td>Haddock, T Murphy, C</td>
</tr>
</tbody>
</table>

CHEM 585 **Materials Chemistry Seminar**  credit: 1 hours.
Required of all Chemistry graduate students whose area is materials chemistry. Prerequisite: Enrollment is allowed only by second-year graduate students who are presenting their Ph.D. literature seminar during that semester. Undergraduate students are not eligible to enroll in this course.

<table>
<thead>
<tr>
<th>CRN</th>
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<th>Section</th>
<th>Time</th>
<th>Days</th>
<th>Location</th>
<th>Instructor</th>
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</thead>
<tbody>
<tr>
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<td>Lecture-Discussion</td>
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<td>04:00 PM - 05:50 PM</td>
<td>R</td>
<td>1024 - Chemistry Annex</td>
<td>Murphy, C</td>
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</table>

Restricted to Chemistry major(s). Restricted to Graduate - Urbana-Champaign.

CHEM 590 **Special Topics in Chemistry**  credit: 1 TO 4 hours.
Designed for students majoring or minoring in chemistry who wish to undertake individual studies of a non-research nature under the direction of a faculty member of the department. Approved for both letter and S/U grading. Prerequisite: Consent of instructor and written approval of department head. Staff for the course is the same as for CHEM 599.

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
<th>Days</th>
<th>Location</th>
<th>Instructor</th>
</tr>
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<tbody>
<tr>
<td>10512</td>
<td>Independent Study</td>
<td></td>
<td>ARRANGED</td>
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</tr>
</tbody>
</table>

Departmental Approval Required

CHEM 599 **Thesis Research**  credit: 0 TO 16 hours.
Candidates for the master's degree who elect research are required to present a thesis. A thesis is always required of students working toward the degree of Doctor of Philosophy. Not all candidates for thesis work necessarily are accepted. Any student whose major is in
a department other than chemistry or chemical engineering must receive permission from the head of the Department of Chemistry to register in this course. Approved for S/U grading only. May be repeated in separate terms. During Summer terms, this course can only be taken for 0 to 8 hours.

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<thead>
<tr>
<th>CRN</th>
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<th>Section</th>
<th>Time</th>
<th>Days</th>
<th>Location</th>
<th>Instructor</th>
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<tbody>
<tr>
<td>10514</td>
<td>Independent Study</td>
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<td>ARRANGED</td>
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</tr>
</tbody>
</table>

Departmental Approval Required