Course Syllabus
Fast-Track Organic Chemistry (II) 2425 73200 - 73201
Spring 2017

Math and Natural Science Learning Center
Division Office: P-330
Phone: 972-273-3500
Hours: Monday –Thursday 8 a.m. - 8:30 p.m.
     Friday 8 a.m. - 4:30 p.m.

This course syllabus is intended as a set of guidelines for Organic Chemistry 2423. Both North Lake College and your instructor reserve the right to make modifications in content, schedule, and requirements as necessary to promote the best education possible within prevailing conditions affecting this course.

Instructor Information:

Instructor: Dr. Kay I. Kouadio
Email: angobil@dcccd.edu
Office Phone: 972-273-3511
Office: C303C
Office hrs: M: 12:30pm – 1:30pm
            TR: 9:30am – 10:25am
            F: 7:45 AM – 9:45 AM

Course Information
Course title: Organic Chemistry 2425
Credit hours: 4 credit hours
Class meeting time: 11:00 AM – 1:50 PM

Course Description: CHEM 2425 is an organic chemistry course designed for highly motivated students who are majoring in science or science-related fields and who have already taken CHM 1411, 1412, and 2423 courses. It is the second part of College Organic Chemistry. Indeed, topics such as structure determination (mass spectrometry, IR, NMR, UV-Vis), conjugation and Diels-Alder pericyclic reactions, benzene and derivatives, nucleophilic aromatic substitution reactions, carboxylic acids and their derivatives will be covered.
Furthermore, enols, enolates, esters, and amines are also introduced. Finally, the structures of life molecules will be explored.

**Course prerequisites:** Chemistry 2423. Developmental Reading 0093 or English as a Second Language (ESOL) 0044 or have met the Texas Success Initiative (TSI) standard in Reading.

**Required or Recommended Textbooks and Materials**

3. **Dr. Kouadio’s Organic Chemistry II Lecture Templates, 3rd edition.**
4. **Laboratory:** Online Handouts. See Lab instructor.
5. **Sapling Learning Access Code:** can be purchased online at [www.Saplinglearning.com](http://www.Saplinglearning.com).

**Course Objectives**

The goal of this course is to give you a basic understanding of the complex organic and biological reactions that take place in biological systems. Either you plan to become an MD or a pharmacist, the completion of this course will help you understand better the different concepts and facts that you will be exposed to at your next program. This course will help you to tackle advanced courses and tests such as Molecular Biology, Genetics, Biochemistry, MCAT, PCAT… with ease.

**Course Learning Outcomes**

1. Define redox reactions. Introduce the difference types of reducing and oxidizing used in Organic Chemistry. Discuss redox reactions (and mechanisms) of the alkenes and alkynes: hydrogenation, epoxidation, ozonolysis, cleavage. The oxidation of alcohols is also discussed.
2. Introduce radical reactions and the 4 different classes of radicals: methyl, primary, secondary, and tertiary radicals. Discuss the stability of radicals. Discuss the chemistry of radical initiators and inhibitors (scavengers). Compare radical halogenation reactions of chlorine and bromine using Hammond’s postulate: selectivity and thermodynamics. Investigate the application of radical halogenation to organic synthesis of alkanes, alcohols, and alkenes. Discuss the stereochemistry of radical halogenation. Revisit CFCs and the effect of their uses on the Earth ozone layer. Contrast radical and ionic (polar) brominations of allylic systems: NBS/peroxide/light vs. no light. Discuss Markovnikov and non-Markovnikov hydrobromination of alkenes. Explain why HCl and HI do not add radically to alkenes. Finally, introduce the chemistry of polymerization of alkenes and current industrial methods of polymerization: radical and ionic.
3. Introduce 4 techniques of structure determination: Mass spect, IR, NMR, and UV-vis. Discuss the basic principle behind mass spectrometry. Describe the different parts of a mass spectrometer and explain how it works. Define cation radical, base peak, parent peak. Read a mass spectrum and determine the molecular weight of an unknown compound. Explain the origins of the M+1 and M+2 peaks on a mass spectrum. Use M+ to get all the possible molecular formulas of the compounds responsible for a given M+. Discuss other types of mass spectrometry: high resolution mass spect, GC-mass spect, and electron spray ionization (ESI) mass spect. Discuss the fragmentation patterns of alcohols, amines, aldehydes, and ketones: alpha cleavage, dehydration, and McLafferty rearrangement.

4. Revisit the electromagnetic spectrum with emphasis on IR, radiofrequency, and UV-vis regions. Discuss general spectroscopy as applied in IR, NMR, and UV-vis methods of analysis. Describe the different parts of a spectroscope. Review the different spectroscopic methods: IR, NMR, UV-vis. Explain the roles of IR, NMR, and UV-vis in structure determination. Describe the basic principle behind IR: vibrational transitions. Explain the electromagnetic range used in IR in terms of wavelength and wave number. Introduce the IR spectrum and its interpretation. Discuss the 3 major regions in an IR spectrum and the fingerprint region. Explain IR absorption patterns using bond strength, bond polarity, atomic size, and %s character. Discuss the absorption patterns of common functional groups such as alcohols, carboxylic acids, aldehydes, ketones, and esters.

5. General review of mass spect, IR, NMR, and UV-vis methods. Explain the types of NMR. Discuss nuclear spins and the basic principle behind NMR spectroscopy: spin orientation in magnetic and nonmagnetic fields; radiofrequency, applied field, and spin flips. Describe the different components of an NMR spectrometer. Discuss the NMR spectrum. Explain the concept of chemically equivalent hydrogens: unrelated, homotopic, enantiotopic, and diasterotopic. Introduce chemical shift and NMR spectrum calibration: TMS. Introduce the delta scale. Discuss shielded and deshielded nuclei, upfield and downfield regions of the spectrum. Describe chemical shift ranges used in H-1 and C-13 NMR techniques. Discuss the 6 major regions in H-1 NMR spectroscopy. Explain ring current in benzene and how it is affected by the applied field. Discuss the integration of a H-1 NMR spectrum. Explain spin-spin coupling of simple and complex non equivalents hydrogens on adjacent carbons: n+1 and (n+1)(m+1) rules, multiplicities (singlets, doublets, etc.), coupling constant J, and tree diagrams. Discuss the OH and NH protons. Describe the use of H-1 NMR in chemical synthesis: Markonikov vs. nonMarkonikov evidence. Explain C-13 NMR. Contrast H-1 and C-13 NMR spectroscopies.

6. Describe dienes: conjugated, cumulated, isolated. Discuss conjugated dienes and their methods of synthesis. Explain the stability of conjugated dienes using the Valence Bond theory. Discuss the stereochemistry of conjugated
dienes: trans-trans, cis-cis, cis-trans. Describe the conformers of conjugated dienes: s-cis and s-trans conformers. Explain the unusual stability of the allylic carbocation using electron delocalization. Introduce the common resonance structures encountered in organic chemistry: allylic and conjugated systems, systems with a lone pair next to a positive charge, and species containing a double bond. Discuss electron delocalization and hybridization. Contrast the addition of HX to nonconjugated and conjugated dienes: kinetic and thermodynamic controls.

Discuss the Diels-Alder reaction: characteristics, diene, dienophile, stereochemistry of cycloalkene product, endo-exo cyclic compounds, retrosynthesis, and successive Diels-Alder reactions.

Explain the basic principle behind UV-vis spectroscopy. Discuss the spectrophotometer instrument. Describe the UV-vis spectrum and the concept of $\lambda_{\text{max}}$. Review Beer-Lambert’s law and calculation of concentration using absorbance. Discuss the molecular orbital theory and its application to conjugated dienes: butadiene, HOMO-LUMO, energy gap and UV-vis transitions ($\pi\rightarrow\pi^*$, $n\rightarrow\pi^*$).

7. Describe the three types of hydrocarbons: saturated, unsaturated, and aromatic (arenes) hydrocarbons. Discuss arenes and their sources: fossil fuels. Name mono and polysubstituted arenes. Explore the spectroscopy of aromatic substances: IR, NMR, UV-vis. Discuss polycyclic aromatic hydrocarbons (PAH) (naphthalene, anthracene, benzo(a)pyrene, and phenanthrene), and drugs containing benzene rings (aspirin, valium, viagra, propofol). Contrast the stability of benzene with other unsaturated compounds with regard to addition reactions. Use heats of hydrogenation to prove the unusual stability of the benzene ring. Describe the actual structure of benzene using electron delocalization. Draw the VB sketch of benzene. Discuss the molecular orbital view of benzene and the Hückel theory of aromatic systems: the $4\pi+2$ rule. Describe aromatic, antiaromatic, and nonaromatic systems. Draw inscribed polygons of MOs and used them to assign Aromaticity.

8. Discuss in detail electrophilic aromatic substitutions of benzene and mechanisms: nitration, sulfonation, halogenation, Friedel-Crafts alkylation and acylation. Describe group orientation in reactions involving monosubstituted benzenes: ortho-para directors and activators, ortho-para directors and deactivators, and meta directors and deactivators. Explain the theory of activation and deactivation: inductive electron donating and withdrawing, resonance electron donating and withdrawing. Use some examples to explain group orientation. Describe the reactions of disubstituted
benzenes: ortho and meta disubstituted benzenes. Discuss the use of electrophilic substitution reactions in organic synthesis: direct synthesis and retrosynthesis. Explain the difference between nucleophilic aromatic substitution and electrophilic aromatic substitution reactions: the Meisenheimer intermediate. Explain benzyne and phenol synthesis. Contrast nucleophilic aromatic substitution reaction and phenol synthesis. Discuss the other reactions of benzene and derivatives: bromination of alkyl benzene side chains, oxidation of alkyl benzene side chains, reduction of alkyl benzene with unsaturated side chains, hydrogenation of unsaturated side chains, reduction of the benzene ring, reduction of aryl alkyl ketones (the Clemmensen reaction reaction, the Wolf-Kishner reduction reaction), reduction of aryl amino groups to amines, multistep synthesis.

9. Describe the general structure of carboxylic acid. Discuss the polar nature of the carbonyl group. Name carboxylic acids (IUPAC and common names). Name diacids. Describe the physical properties of carboxylic acids (melting points, boiling points). Discuss the spectroscopic properties of carboxylic acids (IR, NMR, UV-vis). Describe salts of carboxylic acids: carboxylates, soaps (saponification). Discuss the synthesis of carboxylic acids: oxidation of primary alcohols, oxidation of alkyl benzenes, oxidative cleavage of alkynes and alkenes, oxidation of aldehydes with Tollens’ reagent. Investigate the reactions of carboxylic acids: acid-base reactions. Describe the extraction of carboxylic acids from alcohols. Discuss the chemistry of special carboxylic acids such as sulfonic acids and amino acids (isoelectric point, zwitterion).

10. Discuss the general structures of carbonyl compounds. Describe the general reactions of carbonyl compounds and their mechanisms: nucleophilic addition reactions of aldehydes and ketones, nucleophilic substitution reactions of carboxylic acids and derivatives (esters, amides, acid chlorides, acid anhydrides). Discuss the oxidation reactions of carbonyl compounds. Investigate the reduction of carbonyl compounds. Explain asymmetric reduction. Discuss enantioselectivity in the biological world. Investigate the broad chemistry of organometallic reagents: organolithium, organomagnesium (Grignard reagents), organocuprates (Gilman’s reagents), metal acetylide reagents. Discuss ring opening. Explain group protection.

11. Explain nucleophilic addition reactions. Discuss the general structures of aldehydes and ketones. Investigate the reactivity of aldehydes and ketones. Name aldehydes and ketones (IUPAC and common names). Discuss the physical properties of aldehydes and ketones. Explain the spectroscopy of aldehydes and ketones. Discuss interesting aldehydes and ketones. Describe the synthesis of aldehydes and ketones. Discuss the reactions of aldehydes and ketones (the Wittig reaction). Explain the hydration of aldehydes and ketones: formation of gem-diols. Discuss the thermodynamics and kinetics of hydration. Investigate hemiacetal, acetal, and ketal formation. Discuss group protection through acetal formation. Explain hydrolysis of acetals. Discuss cyclic hemiacetals (lactols) and acetals. Discuss internal cyclizations of
carbohydrates: alpha and beta glucose. Explain Haworth projections. Investigate the structures of monosaccharides (glucose, fructose), disaccharides (sucrose), and polysaccharides (starch and cellulose). Discuss the chemistry of the qualitative tests used to detect aldehydes and ketones: Tollen, Fehling, Benedict, bisulfite, Sciff’s Fuchsin, Purpald, Oxime, phenylhydrazone, semicarbazone, iodoform, and Bayer.

12. Discuss the common carboxylic acid derivatives and related compounds: esters, acid chloride, amide, acid anhydride, lactones and lactams, nitriles. Explain the general electronic structure of carbonyl compounds. Discuss the basicity of Z in RCOZ. Give IUPAC and common names of carboxylic acids and derivatives. Discuss the spectroscopic properties of carboxylic acids and derivatives: IR, NMR, UV-vis. Discuss some interesting esters and amides. Explain the structures of peptides, polypeptides, and proteins. Discuss nucleophilic acyl substitution reactions. Explain the relative reactivity of carboxylic acids and derivatives in acyl substitution reactions. Discuss esterification and hydrolysis reactions. Discuss the reactions of nitriles.

13. Discuss the general structure of amines. Explain the 4 different types of amines: primary, secondary, tertiary, and ammonium salts. Describe the bonding in amines. Discuss the chirality of simple amines and quaternary ammonium salts. Give IUPAC and common names of amines and heterocyclic amines. Discuss the physical properties (melting and boiling points) and sources of the amines. Explain the spectroscopic properties of amines: mass spect., IR, NMR. Discuss important amines: putrescine, cadaverine, trimethylamine, alkaloids (quinine, morphine, cocaine, caffeine, nicotine, conine. Explain histamine and the mode of action of antihistamines. Describe 2-phenylrhtylamine and derivatives: adrenaline, methamphetamine, noradrenaline, LSD, codeine. Describe the synthesis of amines: the Gabriel synthesis. Investigate the reactions of amines. Discuss the effects of electron donating and electron withdrawing groups on the basicity of simple and aryl amines. of the alkynes. Explain the basicity of pyridine, Pyrolle, pyridine, and piperidine. Discuss amines as nucleophiles. Explain the Hoffman elimination reaction. Describe the formation of alkyl Diazonium salt and N-nitrosamines. Explain the use of aryl diazonium salts in the synthesis of aryl compounds. Describe the coupling reactions of aryl Diazonium salts. Explain the formation of phenylhydrazones and semicarbazones in their uses in identifying aldehydes and ketones. Describe the structure of nucleotides and nucleic acids.

14. Describe the substitution reactions of carbonyl compounds at the alpha carbon. Describe enol and enolate formation at the alpha carbon. Discuss the tautomerization of keto forms to enol forms in acid and base. Explain the use of enols and enolates as nucleophiles. Discuss the formation of ester, nitrile, and beta-dicarbonyl enolates. Describe the general reactions of enolates. Explain thermodynamic and kinetic enolates. Discuss racemization at the alpha-carbon. Investigate the reactions at the alpha carbon: halogenation and
haloform formation, alkylation of symmetrical and unsymmetrical ketones, malonic ester synthesis, intramolecular malonic ester synthesis.

15. Describe carbonyl aldol condensation reactions. Explain the dehydration of aldol product. Describe cross aldol condensation. Discuss useful and direct aldol reactions. Describe the Claisen reaction. Explain crossed Claisen and related reactions: Michael, Dickman, Robinson annulation.

Course Outline

Please see Appendix A attached to this syllabus for a complete and detailed course outline.

Means of Assessment of Course Learning Outcomes

These outcomes will be assessed using methods of testing through departmental exams, in class group work, Sapling Learning Chemistry assignments, and written lab reports.

Evaluation Procedures

Homework problems are assigned and graded. You will be using Sapling Learning Chemistry, an online tutorial and homework program. You can go directly to the Sapling Learning Chemistry web site without going through eCampus by going to www.Saplinglearning.com. Many of the problems in Sapling Learning Chemistry are based on the textbook. Students are strongly encouraged to complete the assignments in preparation for the tests. Late homework are not accepted. Also included in the Sapling Learning Chemistry assignments are practice problems to help you understand the material. The practice problems are optional. Details on how to register and enroll in our course on Sapling Learning Chemistry can be found under the Assignments button in eCampus. Your homework grades are posted on the Sapling Learning Chemistry website. Your final homework average for the course will be posted in eCampus.

The lab reports will be graded by the following week in lab. You may look over your reports, but they will not be returned.

Exams

The 5 exams will be multiple choice. Each exam (except the final) will be taken at the Testing Center on the stated dates. A green scantron is required for all exams including the final. Exams must be taken during the scheduled times! Any student who misses a test deadline with an excused absence can only earn a maximum of 70% of the total points! Exams will be cumulative;
however, they will focus on more recent material. The final exam will be given during our scheduled time in the classroom. MAKE-UPS: For a missed exam with an excused absence during the testing dates, a make-up exam must be taken as soon as possible at the discretion of the instructor. Excused absences will only be offered for one of the following reasons: illness, death in family, official University business, or documented emergency.

The Testing Center will provide scratch paper and a copy of the periodic table. You will need to bring a pen or pencil and your scientific calculator to the testing center along with your picture ID. You may use your own programmable calculator if you agree to have the memory cleared before and after the exam. The Testing Center is located in A425. Be sure to arrive in plenty of time to take the exam. The normal hours are M-R 8:30am to 9:00pm, F-Sat 8:30am to 3:30pm, and closed Sun. Be sure to check the hours of the testing center particularly if there are changes due to holiday hours. For more information about the Testing Center go to http://www.northlakecollege.edu/resources/testing.html

**Grading Scale**

The grades will be based on the following distribution

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Five Exams</td>
<td>60%</td>
</tr>
<tr>
<td>Computer based Homework</td>
<td>10%</td>
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<tr>
<td>Lab</td>
<td>30%</td>
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</tbody>
</table>

A = 90-100  B = 80-89  C = 70-79  D = 60-69  F = 0-59

**Grades will be posted on e-Campus when scantrons are graded.**

To calculate your grade at any time you may wish to use the following formula. Please, do not ask me to calculate your grade during the semester as you can do it yourself.

Grade = (Exam Avg x 0.60) + (Sapling Hmwk Avg x 0.10) + (Lab Avg x 0.30)

**Discipline/ Course/ Department/Policies**

**Science Learning Center**
The Science Learning Center (P333) provides tutorial services for North Lake science students. For more information call 972-273-3273 or go to http://www.northlakecollege.edu/resources/tutoring.html
INSTITUTIONAL POLICIES

Classroom Policies:
• Attendance in all class lectures and labs are mandatory. You are encouraged to ask questions and to participate in class discussions. You are expected to be an active learner and not a passive one. **Students should be aware of the fact that they are responsible for all materials handed out and all announcements made during their absence regardless of the reason(s) of the absence.**
• Excused absences will only be offered for one of the following reasons: illness, death in family, official University business, or documented emergency. For any excused absence written documentation is required. To obtain an excused absence, email me or call me at 972-273-3236 by the next class period. Documentation should be brought to the next class meeting.
• No cell phones or beeping devices allowed.
• No texting.
• Distractive talking or any disorderly conduct is prohibited. Please be courteous of others.
• Taping of lectures is not allowed unless permission is obtained from the instructor.
• Model citizenship and collegiate attitude are expected from all students as outlined in the Code of Student Conduct.
• Students are encouraged to go to the Science Learning Center for help.
• This course is a college level course taught at a very high pace. Unnecessary grumbling about the pace or the difficulty of the material and other puerile mannerisms are highly distractive, and therefore, not welcome.
• Students should understand that grades are earned, not given. Final grades are assigned on a merit basis regardless of personal GPA needs or future career goals. Therefore, begging for grades is useless, unethical, and counterproductive and is absolutely discouraged. Students have the sole responsibility for their own GPAs.
• Grade boosting term papers are not given in this course by the end of the semester.
• This instructor does not change earned grades by the end of the semester to suit a student need. No exceptions!!!!
• A student’s grade or score will not be released to a third party.
• The instructor cannot drop you from this course. If you do not drop yourself, you will receive an F. If you stop coming to class or if you do not come prior to the certification date, you will not be dropped. You can drop on-line in some instances or go to the Admissions Office.

ACADEMIC DISHONESTY
The Student Code of Conduct prohibits academic dishonesty and prescribes penalties for violations. According to this code, which is printed in the college catalog, "academic dishonesty", includes (but is not limited to) cheating, fabrication, facilitating academic dishonesty, plagiarism, and collusion".
Academic dishonesty may result in the following sanctions, including, but not limited to:
1. A grade of zero or a lowered grade on the assignment or course.
2. A reprimand.
3. Suspension from the college.

**NOTIFICATION OF ABSENCE DUE TO RELIGIOUS HOLY DAY(S)**
Students who will be absent from class for the observance of a religious holiday must notify the instructor in advance. Please refer to the Student Obligations section of the college catalog for more explanation. You are required to complete any assignments or take any examinations missed as a result of the absence within the time frame specified by your instructor.

**REQUIREMENTS OF THE AMERICANS WITH DISABILITIES ACT**
In accordance with the Americans with Disabilities Act and Section 504 of the Rehabilitation Act of 1973, any student who feels that he or she may need any special assistance or accommodation because of an impairment or disabling condition should contact the ADA/ACCESS Office at (972) 273-3165 or visit Room A-430 at North Lake College. It is the policy of NLC to provide reasonable accommodations as required to afford equal educational opportunity. It is the student's responsibility to contact the ADA/ACCESS Office.

**DROP POLICY**
If you are unable to complete this course, you must officially withdraw by the date stated on the academic calendar. Withdrawing is a formal procedure which you must initiate; your instructor cannot do it for you. If you are dropping a class(es), go to the Admissions Office (A405) and complete a drop or withdrawal form. It is strongly encouraged that a student speaks with the instructor before withdrawing. If a student stops attending class and does not officially withdraw, that student will receive a performance grade based on work completed and missed.

All Dallas County Community Colleges charge a higher tuition rate to students registering the third time for a course. This rule applies to the majority of credit and Continuing Education / Workforce Training courses. Developmental Studies and some other courses are not charged a higher tuition rate. Third attempts include courses taken at any DCCCD college since the fall 2002 semester. For further information, go online to: [http://www.DCCCD.edu/thirdcourseattempt](http://www.DCCCD.edu/thirdcourseattempt).

**FINANCIAL AID STATEMENT**
Students who are receiving any form of financial aid should check with the Financial Aid Office prior to withdrawing from classes. Withdrawals may affect your eligibility to receive further aid and could cause you to be in a position of repayment for the current semester. Students who fail to attend or participate are also subject to this policy.

To apply for financial aid in the DCCCD, students must complete FAFSA (Free Application for Federal Student Aid) on the web at [http://www.fafsa.ed.gov](http://www.fafsa.ed.gov).

**COUNSELING SERVICES**
Counseling services for personal issues are provided to all students currently enrolled at North Lake College. These services are provided by licensed professionals who are bound by
confidentiality (within ethical parameters) at no charge. With the assistance of a counselor, students are able to identify, understand, resolve issues and develop appropriate skills. To make an appointment call 972-273-3333 or visit A 430.

**STOP BEFORE YOU DROP**

For students who enrolled in college level courses for the first time in the fall of 2007, Texas Education Code 51.907 limits the number of courses a student may drop. You may drop no more than 6 courses during your entire undergraduate career unless the drop qualifies as an exception. Your campus counseling/advising center will give you more information on the allowable exceptions. Remember that once you have accumulated 6 non-exempt drops, you cannot drop any other courses with a “W”. Therefore, please exercise caution when dropping courses in any Texas public institution of higher learning, including all seven of the Dallas County Community Colleges. For more information, you may access: https://www1.dcccd.edu/coursedrops

**WRITING CENTER (A309)**

The Writing Center supports and supplements classroom instruction by providing focused, individualized writing instruction in response to the specific needs of the student. Its services are available to all North Lake students, not just those enrolled in English classes. The tutors are skilled writing specialists who can help students clarify writing tasks, understand instructors' requirements, develop and organize papers, explore revision options, detect grammar and punctuation errors, and properly use and document sources. Rather than merely editing or "fixing" students' papers, the Writing Center staff focuses on helping students develop and improve their writing skills.

Located in Room A309, the Writing Center is open 8:00 AM to 9:30 PM Monday through Thursday and 8:00 AM to 5:00 PM on Friday. Saturday hours are 9:00 AM to 2:00 PM during fall and spring semesters. Hours will vary during other sessions. Students who have scheduled an appointment in advance will have a tutor available to work with them at their scheduled time. Walk-ins are welcome, but they may have to wait for an opening or make an appointment for a later time, perhaps a later day. To schedule an appointment, come by the Writing Center, call 972-273-3089, or email nlcwritingcenter@dcccd.edu.

**State Outcomes Core Curriculum**

As part of the core, this course contributes to the development of 6 basic Program Level Outcomes. These Outcomes are essential to the learning process in any discipline and are defined by the Texas Higher Education Coordinating Board.

This course reinforces Program Level Outcome 1 with written and visual communications, Program Level Outcome 2, 3, and 4.
**Program-Level Outcome 1: Communication Skills** - to include effective development, interpretation and expression of ideas through written, oral and visual communication

1. **Written**: Process and produce effective written communication adapted to audience, purpose, and time constraints.
2. **Oral**: Produce effective oral communication adapted to audience, purpose, and time constraints.
3. **Visual**: Effectively interpret visual images or produce effective visual images.
4. **Listening**: Comprehend, and analyze oral information.

**Program-Level Outcome 2: Critical Thinking Skills** - to include creative thinking, innovation, inquiry, and analysis, evaluation and synthesis of information

**Program-Level Outcome 3: Empirical and Quantitative Skills** - to include the manipulation and analysis of numerical data or observable facts resulting in informed conclusions

**Program-Level Outcome 4: Teamwork** - to include the ability to consider different points of view and to work effectively with others to support a shared purpose or goal

**Program-Level Outcome 5: Personal Responsibility** - to include the ability to connect choices, actions and consequences to ethical decision-making

**Program-Level Outcome 6: Social Responsibility** - to include intercultural competence, knowledge of civic responsibility, and the ability to engage effectively in regional, national, and global communities

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**Learning Activities, Outcomes, and Assessment**

The following table provides examples on how the Course Outcomes, Educational Exemplary Objectives, and Core Curriculum Intellectual Competencies are incorporated into the course.

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<tbody>
<tr>
<td><strong>1. Learning Activity:</strong></td>
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<tr>
<td>a. <strong>Learning Outcomes</strong>: Students will identify the structure of an unknown compound using the splitting patterns in a $^1$H NMR spectrum. 70% proficiency.</td>
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<tr>
<td>b. <strong>Assessment</strong>: Students will discuss their answers in class and the assessment is the question on the departmental exam.</td>
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<td>c. <strong>Program Level Outcome 2, Specific Course Outcome 3</strong></td>
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<tr>
<td><strong>2. Learning Activity</strong>: The student will predict the product of a reaction between a primary, secondary, or tertiary alcohol and a given oxidizing agent.</td>
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<tr>
<td>a. <strong>Learning Outcomes</strong>: Students will discuss their answers in class and the assessment is the question on the departmental exam with 75% proficiency</td>
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</tr>
<tr>
<td>b. <strong>Assessment</strong>: Students will discuss their answers in class and the assessment is the question on the departmental exam</td>
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<tr>
<td>c. <strong>Program Level Outcome 3, Specific Course Outcome 6</strong></td>
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</table>
3. Learning Activity:
a. Learning Outcomes: Students will predict the identity whether a ketone or aldehyde is conjugated or unconjugated based on the IR spectrum of the compound. The students will explain the reason for the difference in a written component of the exam. 70% proficiency.
b. Assessment: Students will discuss their answers in class and the assessment is the question on the departmental exam.
c. Program Level Outcomes 1.3, Specific Course Outcomes 5, 6

APPENDIX A:

COURSE OUTLINE

CHM 2425
Chapter 12: Oxidation and Reduction
Chapter 15: Radical Reactions
Chapter 13: Mass Spectrometry and Infrared Spectroscopy
Chapter 14: Nuclear Magnetic Resonance Spectroscopy
Chapter 16: Conjugation, Resonance, and Dienes
Chapter 17: Benzene and Aromatic Compounds
Chapter 18: Electrophilic Aromatic Substitution
Chapter 19: Carboxylic Acids and the Acidity of the O-H Bond
Chapter 20: Introduction to Carboxyl Chemistry
Chapter 21: Aldehydes and Ketones
Chapter 22: Carboxylic Acids and their Derivatives
Chapter 25: Amines
Chapter 23: Substitution Reactions at the α carbon
Chapter 24: Carbonyl Condensation Reactions
### Tentative Exam Schedule

<table>
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<tr>
<th>Exam</th>
<th>Due Date</th>
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<tr>
<td>1</td>
<td>March 27</td>
<td>12, 15, 13</td>
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<tr>
<td>2</td>
<td>Apr 6</td>
<td>14, 16, 17</td>
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<td>3</td>
<td>Apr 14</td>
<td>18, 19, 20</td>
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<tr>
<td>4</td>
<td>May 2</td>
<td>21, 22</td>
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<tr>
<td>Final</td>
<td>May 11</td>
<td>25, 23, 24</td>
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### Week-by-Date

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<th>Week</th>
<th>Date</th>
<th>Chapter</th>
<th>Topic</th>
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<tbody>
<tr>
<td>1</td>
<td>Mar 20</td>
<td>12</td>
<td>Redox Reactions</td>
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<tr>
<td>1</td>
<td>“</td>
<td>15</td>
<td>Radical reactions</td>
</tr>
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<td>March 27</td>
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<td>Mass Spectrometry and IR</td>
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<td>“</td>
<td>14</td>
<td>Nuclear Magnetic resonance</td>
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<td>Apr 3</td>
<td>14</td>
<td>“</td>
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<tr>
<td>3</td>
<td>“</td>
<td>16</td>
<td>Conjugation, Resonance, and Dienes</td>
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<td>Apr 10</td>
<td>17</td>
<td>Benzene and Aromaticity</td>
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<td>“</td>
<td>18</td>
<td>Electrophilic Aromatic Substitution Reactions</td>
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<td>5</td>
<td>Apr 17</td>
<td>19</td>
<td>Carboxylic Acids and the Acidity of the O-H bond</td>
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<td>“</td>
<td>20</td>
<td>Introduction to Carbonyl Chemistry</td>
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<td>April 24</td>
<td>21</td>
<td>Aldehydes and Ketones</td>
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<tr>
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<td>“</td>
<td>22</td>
<td>Carboxylic Acids and their Derivatives</td>
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<td>May 1</td>
<td>25</td>
<td>Amines</td>
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<td>“</td>
<td>23</td>
<td>Substitution Reactions at the Alpha Carbon</td>
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<td>8</td>
<td>May 8</td>
<td>24</td>
<td>Carbonyl Condensation Reactions</td>
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<td>8</td>
<td>May 11</td>
<td>25, 23, 24</td>
<td>Final Exam</td>
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</tbody>
</table>
APPENDIX C:

OCHEM II: TEMPLATES - SMITH RELATIONSHIP

<table>
<thead>
<tr>
<th>Textbook Chapter #</th>
<th>Template Unit #</th>
<th>Test #</th>
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</table>
APPENDIX D:

CALCULATION OF YOUR FINAL GRADE: AN EXAMPLE

Suppose that the following grades are your earned grades on all classwork:

<table>
<thead>
<tr>
<th>Class work</th>
<th>Test 1</th>
<th>Test 2</th>
<th>Test 3</th>
<th>Test 4</th>
<th>Final</th>
<th>Average Lab online</th>
<th>Assign.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Earned Grade</td>
<td>75</td>
<td>85</td>
<td>75</td>
<td>78</td>
<td>88</td>
<td>90</td>
<td>92</td>
</tr>
</tbody>
</table>

Final Grade = [(75 + 85 + 75 + 78 + 88)/5]x(.60) + (90 x .30) + (92 x .10)

Final Grade = 83.83

ASSIGNED EARNED LETTER GRADE: B
APPENDIX E:

Top 10 things Your Teachers Want You to Know:

1. **Understand the course syllabus (your Instructor’s Course Requirements)**
   - Consult it often.

2. **Know your blackboard (e-campus) and econnect (log-on and password).**
   - Consult these sites often.

3. **The classroom is a place to learn. Respect this learning environment.**
   - Disruptive behavior will not be tolerated.
   - Classroom etiquette is important.

4. **As a student, you have responsibilities each and every time you enter the classroom.**
   - Know what your teacher expects from you.
   - Know the emergency procedures for each classroom.

5. **Be an active learner.**
   - Be on time and come prepared.
   - Participate in class.

6. **Instructors differ from one another.**
   - Teachers are as different as their students.
   - Get to know their teaching styles and expectations.

7. **Effective Time Management Skills = less stress!**
   - Use your planner.
   - Work backwards from a due date.
   - Study often.

8. **Be aware of the many additional resources available to students on campus. Take advantage of them.**
   - Tutors, Disability Support Services, etc.

9. **Join a Student Organization**
   - Looks great on a resume.
   - Experience is a wonderful teacher.

10. **It’s all about the Journey.**
    - Enjoy every minute of it
## APPENDIX F:

### Differences Between High School and College

<table>
<thead>
<tr>
<th>HIGH SCHOOL</th>
<th>COLLEGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Your time is usually structured by others.</td>
<td>You manage your own time.</td>
</tr>
<tr>
<td>You can count on parents and teachers to remind you of your responsibilities and to guide you in setting priorities.</td>
<td>You will be faced with a large number of moral and ethical decisions you have not had to face previously. You must balance your responsibilities and set priorities.</td>
</tr>
<tr>
<td>Each day you proceed from one class directly to another.</td>
<td>You often have hours between classes: class times vary throughout the day and evening.</td>
</tr>
<tr>
<td>You spend 6 hours each day – 30 hours a week in class.</td>
<td>You spend 12 to 16 hours each week in class.</td>
</tr>
<tr>
<td>Teachers carefully monitor class attendance.</td>
<td>Professors may not formally take roll, but they are still likely to know whether or not you attend.</td>
</tr>
<tr>
<td>Teachers check your completed homework.</td>
<td>Professors may not always check completed homework, but they will assume you can perform the same tasks on tests.</td>
</tr>
<tr>
<td>Teachers approach you if they believe you need assistance.</td>
<td>Professors are usually open and helpful, but most expect you to initiate contact if you need assistance.</td>
</tr>
<tr>
<td>Teachers often write information on the board to be copied in your notes.</td>
<td>Professors may lecture nonstop, expecting you to identify the important points in your notes. When professors write on the board, it may be to amplify the lecture, not to summarize it. Good notes are a must.</td>
</tr>
<tr>
<td>Teachers often take time to remind you of assignments and due dates.</td>
<td>Professors expect you to read, save, and consult the course syllabus (outline); the syllabus spells out exactly what is expected of you, when it is due, and how you will be graded.</td>
</tr>
<tr>
<td>You may study outside of class as little as 0 to 2 hours a week, and this may be mostly last-minute test preparation.</td>
<td>You need to study at least 2 to 3 hours outside of class for each hour of class.</td>
</tr>
<tr>
<td>You will usually be told in class what you needed to learn from assigned readings.</td>
<td>It’s up to you to read and understand the assigned material; lectures and assignments proceed from the assumption that you’ve already done so.</td>
</tr>
<tr>
<td>Testing is frequent and covers small amounts of material.</td>
<td>Testing is usually infrequent and may be cumulative, covering large amounts of material. You, not the professor, need to organize the material to prepare for the test. A particular course may have only 2 or 3 tests in a semester.</td>
</tr>
<tr>
<td>Makeup tests are often available.</td>
<td>Makeup tests are seldom an option; if they are, you need to request them.</td>
</tr>
<tr>
<td>Consistently good homework grades may help raise your overall grade when test grades are low.</td>
<td>Grades on tests and major papers usually provide most of the course grade.</td>
</tr>
<tr>
<td>Initial test grades, especially when they are low, may not have adverse effect on your final grade.</td>
<td>Watch out for the first tests. These are usually wake-up call to let you know what is expected – but they also may account for a substantial part of your course grade.</td>
</tr>
</tbody>
</table>

**NOTE:** The instructor reserves the right to amend this document as needed.