Kent Core Course Proposal Questionnaire

Please review the Kent Core Policy Statement before completing and submitting the questionnaire to the University Requirements Curriculum Committee accompanied by a Course Catalog Update workflow and typical course syllabus.

Date: 11/26/14

Department/School: Chemistry and Biochemistry

Course ID: CHEM 10055 **Credit Hours:** 3

Course Title: Molecules of Life

Prerequisite(s): None

Select Kent Core Category:

- ☐ **Composition**
- ☐ **Mathematics and Critical Reasoning**
- ☐ **Humanities and Fine Arts**
  - ☐ **Humanities**
  - ☐ **Fine Arts**
- ☐ **Social Sciences**
- ☒ **Basic Sciences**
- ☐ **Additional**

1. **Explain how the course addresses (a) concepts central to the subject area and (b) the specific Kent Core learning goals listed in the *University Catalog* (www.kent.edu/catalog/kent-core)**

   a. **Acquire critical thinking and problem-solving skills.**

   Problem solving and critical thinking are an integral part of this course and will be utilized throughout the entire course. Students will be required to solve problems in topics such as buffer and pH calculations, structure-property relationships and stereochemistry. This requires students to learn a significant body of fundamental principles and to understand how these principles can be used and applied to problems in health-related areas and biochemistry Synthesis and inquiry-based activities (through homework, in-class activities, and supplementary instruction) will be used throughout the course to encourage development of these skills. All intra-term exams and the final exam will be cumulative in nature and will encompass significant amounts of analysis, problem solving and critical thinking.

   b. **Apply principles of effective written and oral communications.**

   Students will provide written answers in all examinations. In addition, the instructor will communicate with students using Blackboard Collaborate in a written format in real time. Such communication will generally occur the night before an examination is given. The instructor will often provide help sessions (usually on a weekly basis) and students will be required to communicate orally with the instructor during these sessions.

   c. **Broaden their imagination and develop their creativity.**

   Chemistry is a subject that naturally requires students to be constantly developing their imagination. From picturing how small an atom is to how chiral materials may interact with chiral receptors in the body, students will continually be required to demonstrate

CHEM 10

their powers of imagination and creativity.

d. Cultivate their natural curiosity and begin a lifelong pursuit of knowledge.

Chemists are constantly fascinated by the variety of interactions between differing drugs and the human body, the nature of the atom, and remarkable changes that may occur when modifying the structures of biomolecules for example. This course serves to foster this curiosity with particular emphasis on the relationship between chemistry and health related topics.

e. Develop competencies and values vital to responsible uses of information and technology.

Mandatory homework activities will require students to use an online software package and so students must learn to use computers and software in an appropriate manner.

f. Engage in independent thinking, develop their own voice and vision and become informed, responsible citizens.

Students will be given the opportunity to discuss the moral, ethical, and socio-economic issues that arise when considering topics such as generic vs brand name pharmaceuticals development, single enantiomer vs. racemic mixture pharmaceutical development, use of radioisotopes in medicine, genetic engineering etc. Students will be given an opportunity to assess and debate such issues in group discussions. In these sessions the instructor may also assign an article for students to read on a given topic. To understand the topic and participate in a meaningful discussion, students must understand the underlying chemical principles. Such discussions will help prepare our students to be well-informed individuals who are capable of formulating cogent scientific arguments, and to foster a desire for lifelong learning.

g. Improve their understanding of issues and behaviors concerning inclusion, community and tolerance.

Please see response to f. Students will be shown the impact of chemistry in health and the importance of working together for the good of all citizens. Indeed, our very survival depends on the development of new drugs to combat disease resistant bacteria for example.

h. Increase their awareness of ethical implications of their own and others' actions.

Please see response to f.

i. Integrate their major studies into the broader context of a liberal education.

Development of critical thinking and problem solving skills in this course will be of benefit to all courses subsequently taken by these students. Students will also have an appreciation of how science develops and how it has impacted developments in other areas such as art.

j. Strengthen quantitative reasoning skills.

Please see response to a. Quantitative reasoning is central to any course in chemistry and will be constantly developed in the study of topics such as equilibrium, pH etc.

k. Understand basic concepts of the academic disciplines.

Students will be taught basic concepts including, for example, scientific notation, unit

conversions etc.

2. **If this course is being proposed for the Composition category or the Mathematics and Critical Reasoning category, indicate the essential skills that the course is intended to teach, sharpen or strengthen. (Skip this question if the proposed course is intended for other categories.)**

3. **State how the course is representative of a field that has attained maturity and substance with critical mass of its own scholarly literature, methodology, community of specialists and conceptual framework.**

   Chemistry is a mature branch of science that consists of several subdisciplines (organic, inorganic, biochemistry, analytical etc.) where each specialty has an enormous body of underlying primary research literature (published since the early 1800s). The chemical principles studied include well understood concepts that are based on research performed over the past 100+ years. However, the chemistry studied is more current and highlights the importance of chemistry to the everyday lives of students.

4. **Are adequate resources available for this course (e.g., faculty, classroom space, equipment, library holdings)? If yes, explain.**

   There are sufficient resources available for this course to meet enrollment demands. This course will be replacing a course that currently has large enrollment (Introduction to Organic Chemistry, CHEM 10052) and so no new faculty members are needed.

5. **Has this course been offered previously?**

   No

6. **Given the available Kent Core course options, why is it important that this course be added as an option for students in fulfilling their Kent Core?**

   This course is expected to have particularly broad appeal as a health-related course. The course was primarily developed to serve the nursing program and as a consequence it will have large enrollments. It would be of great benefit for nursing students to be allowed the option of using this course to fulfill the basic sciences Kent core since it will be part of their major coursework. Currently, Introduction to Organic Chemistry (CHEM 10052) is being used by the nursing students to fulfill the Kent Core Basic Sciences requirement. Since the new course is replacing 10052, it is logical to allow Molecules of Life to now fulfill this requirement.

7. **Please complete and attach the Kent Core Learning Outcomes Assessment Plan, and attach a sample syllabus.**

CHEM
12

Kent Core Learning Outcomes Assessment Plan

Course number, title (credit hours): CHEM 10055, Molecules of Life (3)

Department/School: Chemistry & Biochemistry

Proposed Kent Core Category:
(please check appropriate box)

- ☐ Composition
- ☐ Mathematics and Critical Reasoning
- ☐ Humanities and Fine Arts
  - ☐ Humanities
  - ☐ Fine Arts
- ☐ Social Sciences
- ☒ Basic Sciences
- ☐ Additional

A sample syllabus must accompany the plan.

I. Kent Core learning objectives	II. Ohio Transfer Module learning objectives	III. What corresponding learning outcomes are included in this course?	IV. What method(s) will be used to assess student learning?	V. What evidence of this assessment will be presented annually for the five-year Kent Core review of this course?
Acquire critical thinking and problem solving skills	Evaluate arguments in a logical fashion; competence in analysis and logical argument	Ability to understand, draw and interpret molecular and ionic formulae/structures. Understand simple chemical equilibria, redox processes. Identify and define common biomolecules. Understand energy changes in biochemical processes.	1.) Exams and homework 2.) Multiple choice surveys assessing mastery of key concepts (as well as student perceptions of mastery) will be administered at the beginning as well as the end of the course.	1) Overall student grades will be monitored to track student performance in the course. 2) We will track a series of concepts/skills developed in the course using pre- and post-course multiple choice surveys. We will track the averages of the scores from those survey questions over time to identify areas in need of improvement.
Apply principles of effective written and oral communication	Communicate effectively			
Broaden their imagination and develop their creativity				
Cultivate their natural curiosity and begin a lifelong pursuit of knowledge				

CHEM 13

I. Kent Core learning objectives	II. Ohio Transfer Module learning objectives	III. What corresponding learning outcomes are included in this course?	IV. What method(s) will be used to assess student learning?	V. What evidence of this assessment will be presented annually for the five-year Kent Core review of this course?
Develop competencies and values vital to responsible uses of information and technology				
Engage in independent thinking, develop their own voice and vision, and become informed, responsible citizens	Engage in our democratic society; be active and informed citizens; develop a disposition to participate in and contribute to our democracy			
Improve their understanding of issues and behaviors concerning inclusion, community and tolerance	Acquire an understanding of our global and diverse culture and society			
Increase their awareness of ethical implications of their own and others' actions				
Integrate their major studies into the broader context of a liberal education				
Strengthen quantitative reasoning skills		Students develop critical skills to solve via math and visualizing 3D structures of molecules that are found in health and medicine	1.) Exams and homework 2.) Multiple choice surveys assessing mastery of key concepts (as well as student perceptions of mastery) will be administered at the beginning as well as the end of the course.	1) Overall student grades will be monitored to track student performance in the course. 2) We will track a series of concepts/skills developed in the course using pre- and post-course multiple choice surveys. We will track the averages of the scores from those survey questions over time to identify areas in need of improvement.

WEM
OHEM
14

I. Kent Core learning objectives	II. Ohio Transfer Module learning objectives	III. What corresponding learning outcomes are included in this course?	IV. What method(s) will be used to assess student learning?	V. What evidence of this assessment will be presented annually for the five-year Kent Core review of this course?
Understand basic concepts of the academic discipline	Employ the methods of inquiry characteristic of natural sciences, social sciences and the arts and humanities	Students will learn, understand, and apply the central topics of the discipline including atomic structure, chemical bonding, equations, reaction rates etc.	1.) Exams and homework 2.) Multiple choice surveys assessing mastery of key concepts (as well as student perceptions of mastery) will be administered at the beginning as well as the end of the course.	1) Overall student grades will be monitored to track student performance in the course. 2) We will track a series of concepts/skills developed in the course using pre- and post-course multiple choice surveys. We will track the averages of the scores from those survey questions over time to identify areas in need of improvement.

ASSURANCES:

By submitting this proposal, we assure that:

1. The faculty members who teach this course have agreed to the learning outcomes and assessment methods.
2. Assessment results will be reviewed annually by the faculty and submitted to the University Requirements Curriculum Committee.
3. Modifications to the course and/or assessment plan will be based on the annual review.

Michael Tuberger 12/1/14

Department Chair/School Director (or designee) Signature Date

CHEM 15

MOLECULES OF LIFE (CHEM 10055) SECTION 001 (CRN 11675)
SPRING 2015 COURSE OUTLINE

LECTURE MWF: 1:10 – 2:00 pm; Williams Hall 111

REQUIREMENTS Required Text: General, Organic, and Biological Chemistry by Frost & Deal, 2nd edition (ISBN) with access to Mastering Chemistry (online homework).
Required calculator: Texas Instruments TI30XA (or TI30XB) but NOT the TI30XS, which is a statistics calculator; no graphing calculators.

INSTRUCTOR Dr. Ruth Leslie
Office: WMH 231
Phone: 330-672-9434
E-mail: mleslie2@kent.edu
Office Hours: Will be posted on the Course website

COURSE OBJECTIVES

Chem-10055 (Molecules for Life) is a college-level introductory chemistry course designed to introduce students to a broad range of topics related to the chemistry of living organisms. Topics such as atomic and molecular structure, chemical bonding and reactivity, solution chemistry, chemical equilibrium in aqueous systems, and metabolism and the role of energy in chemical reactions will all be studied within the broader context of the functioning biological system. Basic chemical principles will be applied to various aspects of chemistry including behavior of gases and substances in solution, the role of molecular polarity and geometry in driving biological reactivity, and the chemical basis of cellular processes and communication.

Classroom time will be divided into lectures, discussions, and problem-solving sessions to enable students to develop both foundational knowledge and analytical skills.

LEARNING OUTCOMES

Upon successful completion of this course, students will:

1. understand atomic, molecular, and ionic structure
2. be able to represent ionic and molecular species, including more complex organic structures, correctly
3. understand the role of polarity and geometry in determining behavior at the molecular level
4. describe the role of equilibrium in chemical systems
5. understand the role of energy in chemical reactions and its application to metabolism in a living system
6. understand important aspects of solution chemistry and its application to the chemistry of a living organism
7. understand the chemical basis for the functioning of biomacromolecules such as proteins, lipids, and DNA

CHEM
16

PRE-REQUISITES

REGISTRATION REQUIREMENT

The official registration deadline for this course is Sunday January 25th, 2015. University policy requires all students to be officially registered in each class they are attending. Students who are not officially registered for a course by published deadlines should not be attending classes and will not receive credit or a grade for the course. Each student must confirm enrollment by checking his/her class schedule (using Student Tools in FlashFast) prior to the deadline indicated. Registration errors must be corrected prior to the deadline.

The last day to withdraw is Sunday March 22nd, 2015.

ATTENDANCE

Attendance at all class meetings is expected. Students who miss a class are responsible for all materials covered.

COURSE GRADING

The final grade will be determined as follows:

Online Homework	12%
Quizzes	15%
Course Exams (17% each)	51 %
Final Exam	22%

Grades for exams will not be curved and there will be no extra credit.

Grading Scale:

100 - 88% = A	87 - 85% = A-	
84 – 82% = B+	81 – 78% = B	77 – 76% = B-
75 – 73% = C+	72 – 68% = C	67 – 65% = C-
64 – 60% = D+	59 – 56% = D	
55 – 0 % = F		

TEXTBOOK INFORMATION

The required text for this class is General, Organic, and Biological Chemistry by Frost & Deal, 2nd edition.

There is a custom-published version packaged with an access code to the online homework system ISBN, which can be purchased from the bookstore or direct from the publisher (cost $104.05) through the storefront.

Other alternatives include the E-book with homework access and a stand-alone homework access code, also available through the storefront.

CHEM
17

HOMEWORK

Homework sets will be assigned for each chapter, using the online learning system Mastering Chemistry, which is designed specifically for the Frost & Deal text.

An access code for the Mastering Chemistry homework system is pre-packaged together with the custom version of the text (ISBN). Alternatively, for students who already have a copy of the text, access to Mastering Chemistry can be purchased separately ($66.00 for one semester access; ISBN to be announced).

Online homework assignments comprise 12% of the total semester grade.

Completion of all homework modules is required. Make sure you are registered on Mastering for Chemistry and are able to access the assignments as soon as possible. The course code will be e-mailed to you by the instructor. Due dates for these assignments are indicated on the Mastering system, and may not be announced in class. It is the responsibility of the student to ensure that assignments are completed by the due date.

Should you have any problems with the content of assignments please see the instructor as soon as possible. Technical questions should be directed to the Mastering Chemistry online support.

Students should expect to spend AT LEAST 1 - 2 hours per hour of lecture time in assigned reading and homework.

QUIZZES

There will be 4 - 5 quizzes will be given during the semester, each lasting approximately 20 minutes. Dates for some quizzes will be announced in class, along with further information about the material to be covered in each case. In addition, periodic unannounced quizzes will be given. The quizzes comprise 15% of the overall course grade.

EXAMS

There will be three 50 minute examinations during the semester and the examination dates are indicated on the lecture schedule. These dates will not change. All examinations are cumulative: up to 20% of each mid-term examination will include material covered previously.

Make-up exams will be given only for absences due to serious illness or death in the immediate family, at the discretion of the instructor. Students must contact the instructor within 24 hours of a missed examination, by e-mail or phone call, to be considered for a make-up exam.
Verification will be required for all make-up exams, and it is the student's responsibility to supply adequate documentation. Unexcused absences will receive a zero on the exam.

Examinations will be returned to students after students have checked and verified their scores, and model answers will be posted on the course website. Examination

questions will be discussed during subsequent help sessions. Grade disputes on any examination must be brought to the instructor's attention before the next examination.

The final examination is scheduled for

ACADEMIC HONESTY

A zero tolerance policy is in operation in this course for any form of cheating or other academic misconduct.

It is the policy of the University that:

(1) Students enrolled at the University are to perform their academic work according to standards set by faculty members, departments, schools and colleges of the University; and

(2) Cheating and plagiarism constitute fraudulent misrepresentation for which no credit can be given and for which appropriate sanctions are warranted and will be applied.

Academic dishonesty includes (but is not limited to) copying material from another student during an exam, quiz or assignment; falsification of data; bringing study notes into an examination or quiz and changing answers on an exam paper that has already been graded.

During class examinations students may not leave the room except in an emergency. For the duration of all examinations and quizzes cell phones must be switched off and placed in closed bags. Students may only have approved materials (writing implements, molecular model set, class-approved calculator) accessible to them. All other items should be left in a closed bag, and bags should be placed at the front of the room or securely tucked under a chair.

Any student caught cheating will be assigned an F for the course and will be referred to Judicial Affairs.

Please refer to section 3342-3-01.8 of the University Policy Register (found on the web at http://www2.kent.edu/academics/resources/plagiarism/Information-for-Students/index.cfm) for further details on University policies regarding student cheating and plagiarism.

STUDENT ACCESSIBILITY POLICY

University Policy 3342-3-01.3 requires that students with disabilities be provided reasonable accommodations to ensure their equal access to course content. If you have a documented disability and require accommodations, please contact the instructor at the beginning of the semester to make arrangements for necessary classroom adjustments. Please note, you must first verify your eligibility for these through Student Accessibility Services (contact 330-672-3391 or visit www.kent.edu/sas for more information on registration procedures).

Students with documented disabilities who are planning to take quizzes and/or examinations in the SDS must inform the instructor the week prior to EACH examination.

SUPPLEMENTAL INSTRUCTION

A Supplemental Instruction (SI) component is provided for all students who want to improve their understanding of the material taught in this course. SI sessions are led by a student who has already mastered the course material and has been trained to facilitate group sessions where students can meet to compare class notes, review and discuss important concepts, develop strategies for studying, and prepare for exams.

Attendance at SI sessions is voluntary and students may attend as many times as they choose. SI sessions normally begin the second week of class and continue throughout the semester. A session schedule will be announced in class.

For information about the program, session schedule/updates, and possible study guides, visit http://www.kent.edu/si.

EXAM SCHEDULE

Exam 1

Exam 2

Exam 3

Final Exam:

TENTATIVE LECTURE AND EXAMINATION SCHEDULE

This lecture schedule is subject to change. Notice of changes will be given in class. It is the student's responsibility to remain up to date; absence from class is no excuse.

Chapter	Topics	Dates
	Introduction; Course Overview	Jan 12th
1.1 – 1.3 2.1 – 2.3 3.5	Atomic Structure, Elements, and Compounds (classification of matter, periodic table, atomic structure, scale of matter, the mole)	Jan 12th – 16th (2½ sessions)
	Martin Luther King Jr. Day – no classes	**Jan 19th**
3.1; 3.4 – 3.5	Electrons and Covalent Bonding (Lewis dot diagrams, octet rule, covalent compounds, molar mass)	Jan 21st – 23rd (2 sessions)
3.4; 3.6 – 3.7	Molecules – Structure and Shape (Lewis structures, molecular geometry, bond polarity, molecular polarity)	Jan 26th – 30th (2 – 3 sessions)
7.1 – 7.2	Intermolecular Forces and States of Matter	Feb 2nd – 4th (1½ sessions)
7.4; 8.2	Behavior of Gases (solubility, partial pressure, Boyle's Law, role of O_2 in biological systems)	Feb 4th – 9th (2½ sessions)
Exam 1		**Wednesday February 11th**
4.1 – 4.5	Organic Compounds (condensed and skeletal structures, functional groups, structural isomers, naming, polarity and reactivity)	Feb 13th – 18th (3 sessions)
4.5; 7.5 – 7.7	Lipids (fatty acids, cis and trans double bonds, glycerides, ester formation, lipid bilayers)	Feb 20th – 23rd (2 sessions)
10.1, 4.5	Amino Acids and Stereochemistry (amino acids, α carbon, Fischer projections, enantiomers)	Feb 25th (1 session)
3.3	Ionic Bonding (ion formation, polyatomic ions, ionic compounds)	Feb 27th – Mar 2nd (2 sessions)
8.3 – 8.4; 8.6	Substances in Solution (water as a solvent, solubility rules, electrolytes vs nonelectrolytes, molar concentration, osmotic pressure)	Mar 4th – 9th (3 sessions)
9.1 – 9.2 9.4 -9.6	Acids and Bases (Arrhenius definition, pH scale, organic acids and bases, K_a and pK_a)	Mar 11th – 13th (2 sessions)
10.1 – 10.3	Amino Acids and Proteins (pH and amino acid structure, levels of protein structure, protein structure and function)	Mar 16th – 18th (2 sessions)
Exam 2		**Friday March 20th**
9.3; 9.8	Chemical Equilibrium and Buffers (factors affecting equilibrium, buffer components, effect	Mar 30th – Apr 1st (2 sessions)

CHEM
21

	of pH change on buffers, buffers in the blood)	
5.1 – 5.3	Energy in Chemical Reactions (chemical potential energy, heat of reaction, reaction rates, activation energy, free energy)	Apr 3rd –65th (1½ sessions)
6.2; 6.5; 6.6; 12.4; 12.5	Carbohydrates (monosaccharides, acetals, polysaccharides and glycosidic linkages, carbohydrate structure and function, energy from carbohydrates)	Apr 6th – 13th (3½ sessions)
5.4; 12.6	Redox Reactions in Biological Systems (redox processes, reduction potentials and free energy, oxidative phosphorylation, coupling of spontaneous and nonspontaneous processes)	Apr 15th – 17th (2 sessions)
Exam 3		**Monday April 20th**
	The Genetic Code (DNA, RNA, protein synthesis	Apr 22nd – 24th (2 sessions)
	Cellular Information (receptor interactions, enzymes, hormones, drug action)	**Apr 27th – 30th** (3 sessions)
Final Exam		

CHEM
22

SEE FOLLOWING PAGES FOR RESPONSES

Natural Sciences

1) The course directly emphasizes at least one of the learning outcomes for the Transfer Module. Which of these learning outcomes are addressed and how?
   a. *Communicate effectively*: All general education programs include a component for writing; many also include a component for oral communication or presentation
   b. *Evaluate arguments in a logical fashion*: Competence in analysis and logical argument are explicit learning goals for most general education programs, although these skills go by a variety of names (e.g., critical thinking, analysis, logical thinking, etc.)
   c. *Employ the methods of inquiry characteristic of natural sciences, social sciences, and the arts and humanities*: The tools for solving problems vary across disciplines; general education introduces students to methods of inquiry in several fields of study and thereby prepares students to integrate information from different disciplines
   d. *Acquire an understanding of our global and diverse culture and society*
   e. *Engage in our democratic society*: One of the overarching goals of general education is to prepare students to be active and informed citizens, the development of a disposition to participate in and contribute to our democracy is full of equal importance to the goal of having the skills to do so intelligently

2) The course has the required entry level college proficiencies appropriate to the course. Entry level college proficiencies can be shown using a variety of means including placement exams, prerequisite coursework and a description of the course materials.

3) Course is not remedial or developmental.

4) Course does not cover variable content from term to term.

5) Course is not a special topics course.

6) Course is not an upper division course.

7) Course is not a narrowly-focused technical or pre-technical course.

8) Course is an introductory course that makes clear the importance of experimental inquiry in the sciences and the way in which such inquiry into the

CHEM 23

SEE FOLLOWING PAGES FOR RESPONSES

natural world leads scientists to formulate principles that provide universal explanations of diverse phenomena.

9) Course helps the students to develop an understanding of structured thinking involving induction and deduction.

10) Course is from natural science disciplines such as astronomy, biology, chemistry, environmental science, geology, physical geography or physics.

11) The course has as a goal the development of an understanding of how scientific principles are built and used in the modern world and of the impact of science on society.

12) The course does not focus exclusively on content coverage, without addressing the learning outcomes for the Transfer Module.

13) Course has a laboratory component that has at least one credit hour and meets an average of no less than two hours per week.

CHEM
24

Molecules of Life (Ohio Transfer Module Requirement)

1.) The following learning outcomes are addressed in this course: (a) *Communicate Effectively*- Students are required to communicate effectively in both written and oral formats. All students in the course will take 4-5 quizzes, 3 intra-term exams and a final exam. Each exam will include several short answer questions that, for example, require students to relate physical properties to molecular structure and intermolecular forces, evaluating the effect of pH changes on buffers and relating such changes to buffers in blood etc. Effective oral communication will also be required during in-class exercises where the instructor will pose problems to be discussed in a group setting; (b) *Evaluate Arguments in a Logical Fashion*- Problem solving and critical thinking are an integral part of this course and will be utilized throughout the entire course. Students will be required to solve problems in topics such as buffer and pH calculations, structure-property relationships and stereochemistry. Synthesis and inquiry-based activities (through homework, in-class activities, and supplementary instruction) will be used throughout the course to encourage development of these skills. All intra-term exams and the final exam will be cumulative in nature and will encompass significant amounts of analysis, problem solving, and critical thinking; (c) *Employ the Methods of Inquiry Characteristic of Natural Sciences*- Throughout this course students are constantly exposed to tools for solving problems. Some of these tools cut across disciplines and include, for example, unit conversions (integrated within topics such as redox reactions and solution chemistry) and analysis of three-dimensional chemical structures and the implications of stereochemistry on drug receptor interactions and the folding of proteins; (e) *Engage in our Democratic Society*- Students will be given the opportunity to discuss the moral, ethical, and socio-economic issues that arise when considering topics such as generic vs brand name pharmaceuticals development, single enantiomer vs. racemic mixture pharmaceutical development, use of radioisotopes in medicine, genetic engineering etc. Students will assess and debate such issues in group discussions. In these sessions the instructor may also assign an article for students to read on a given topic. To understand the topic and participate in a meaningful discussion, students must understand the underlying chemical principles. Such discussions will help prepare our students to be well-informed individuals who are capable of formulating cogent scientific arguments..
2.) Success in the course requires entry level college proficiency in mathematics as well as reading and written English.
3.) The course is not remedial or developmental in nature.
4.) The course does not have variable content from semester to semester. The detailed content is described in the course syllabus and basic data sheet.
5.) The course is not a special topics course and has been given a designated title and course number (Molecules of Life, CHEM 10055, 3h).

CHEM
25

6.) The course is introductory in nature as designated by the 10055 number (all upper-division courses have numbers at or above 30000).

7.) The course is not narrowly focused, nor is it a pre-technical course. This is clearly demonstrated by reviewing the list of topics covered in the course syllabus. The course covers material drawn from areas of general, organic and biological chemistry with a focus on those areas of relevance to physiological chemical systems.

8.) The course clearly demonstrates the importance of experimental inquiry into the natural world through highlighting how fundamental chemical principles can be used to explain diverse phenomena such as chemical equilibrium and its application to an understanding of buffers in blood, molecular structure and its relationship to intermolecular attractive forces and subsequent application to the understanding of the structure of lipid bilayers and cellular transport etc.

9.) Induction and deduction are central to the course. Students are introduced to fundamental chemical principles and learn how to apply these principles to more complex chemical, biochemical, and health-related topics. Homework and in-class discussions will be used to further promote the principles of induction and deduction in chemistry.

10.) The course is from the natural science discipline of chemistry.

11.) The development of how scientific principles are built and used in the modern world (particularly as applied to important aspects of biochemistry and health-related topics) is at the very heart of this course. The impact of chemistry is highlighted throughout the course (e.g., the use of radioisotopes and pharmaceuticals in medicine).

12.) The course has significant content coverage but addresses the transfer module learning outcomes as described in question 1.

13.) The course does not have a laboratory component. Students will complete their lab requirement with other courses.

CHEM
26

Hello Dr Seed,

The College of Nursing is excited about the new Biochemistry course, Molecules of Life. We believe this course will improve students scientific knowledge and background to become a nurse. The content listed in this course is foundational for nursing students. Thank you for all your work in making this happen.

Sincerely,

Tracey Motter MSN, RN, CNS
Sr. Undergraduate Program Director
Clinical Coordinator
Kent State University College of Nursing
330-672-8784
Tmotter2@kent.edu

From: SEED, ALEXANDER
Sent: Wednesday, September 24, 2014 3:27 PM
To: MOTTER, TRACEY
Cc: LESLIE, MARGARET RUTH
Subject: RE: pilot of new pre-nursing section

Hi Tracey,
The Chemistry & Biochemistry Department has now prepared a detailed basic data sheet for the new course (Molecules of Life). I would like to move the process forward to the College Curriculum Committee in the next couple of weeks. In order to move forward I would like to ask for a letter of support (this can be by e-mail) from the College of Nursing, stating that you intend to incorporate this course as a permanent part of your curriculum. Please feel free to call (330-672-9528) or e-mail me if you have any questions or concerns.
Thanks and best wishes,
Alex.

Dr. Alexander J. Seed
Associate Professor
Dept. of Chemistry & Biochemistry
Kent State University
Kent, OH 44242-0001
Tel: 330-672-9528

From: MOTTER, TRACEY
Sent: Monday, July 21, 2014 10:26 AM
To: SAMPSON, PAUL; TUBERGEN, MICHAEL
Cc: LESLIE, MARGARET RUTH; SEED, ALEXANDER
Subject: RE: pilot of new pre-nursing section

Good Morning,

Thank you for the update. This is awesome. I will let our Curriculum committee know as well. Yes, nursing will help you attempt to get "core" status for the course. I am on URCC so I will support the course.

CHEM
27

Tracey

From: SAMPSON, PAUL
Sent: Friday, July 18, 2014 4:41 PM
To: TUBERGEN, MICHAEL
Cc: MOTTER, TRACEY; LESLIE, MARGARET RUTH; SEED, ALEXANDER
Subject: RE: pilot of new pre-nursing section

Hi Mike,

Yes, we are planning on having Ruth pilot this course in Spring 2015. The plan is to bring the detailed course plan (BDS) forward at the beginning of Fall to the Chemistry Curriculum Committee and then chemistry faculty for formal approval, and get it to the College Curriculum Committee in September. In this way, we should be able to get the course on the books by Fall 2015. One caveat we will need to wrestle with is Kent Core approval – perhaps nursing will be able to assist us here in steering it through the review process. For Spring 2015, we should just take a scheduled section of CHEM 10050 and (with the approval of A&S and nursing) teach it as the new course. We would probably want to restrict this section to pre-nursing students and find a way to advertise this. When I get a little closer to having AY teaching loads organized, we can select a specific Spring section for this offering, assuming this plan is agreeable to all.

Best wishes. Paul

From: TUBERGEN, MICHAEL
Sent: Friday, July 18, 2014 2:25 PM
To: SAMPSON, PAUL
Cc: MOTTER, TRACEY
Subject: pilot of new pre-nursing section

Hi Paul,

Tracy inquired this morning about when we expected to pilot a section of the new pre-nursing chemistry curriculum. I told her Spring. Is that correct? Has Ruth made any more progress in her preparations to offer it?

Thanks,

Mike

CHEM
28

SEED, ALEXANDER

From: SEED, ALEXANDER
Sent: Wednesday, September 24, 2014 2:00 PM
To: CASE, ANDREA; VENEY, SEAN
Subject: Chemistry course addition
Attachments: Molecules of life BDS.pdf; Molecules for Life Syllabus.doc

Hi Andrea/Sean,
As you know, the College of Nursing is reducing its chemistry requirements and no longer requires Introduction to Organic Chemistry (CHEM 10052). The Department believes that nursing students are not well-served by taking Fundamentals of Chemistry (CHEM 10052) alone and so we have been working with nursing to create a new chemistry course that is tailored to nursing students and to students who would like an introductory course in chemistry that deals with important molecules in life (this would be the only chemistry course taken by nursing students if approved). Our new course is entitled Molecules of Life and I have attached the sample syllabus and basic data sheet to this e-mail. I hope to submit the BDS to the College Curriculum Committee shortly but I thought that you may have some interest in this course. Please feel free to call me (330-672-9528) if you have any questions or concerns.
Best wishes,
Alex.

Dr. Alexander J. Seed
Associate Professor
Dept. of Chemistry & Biochemistry
Kent State University
Kent, OH 44242-0001
Tel: 330-672-9528

CHEM
29

KENT STATE UNIVERSITY

Name: Katherine J Smith Submission Date: 1/19/2015

Organization: Curriculum Services

Course Catalog Update

<< Go back to Course Catalog Update form Print

Basic Course Data

Change type: Establish

Faculty member submitting this proposal: Alex Seed

Requested Effective Term: 201580

Campus: Kent

College: AS-Arts and Sciences

Department: CHMB-Chemistry and Biochemistry

Course Subject: CHEM-Chemistry

Course Number: 10055

Course Title: Molecules of Life

Title Abbreviation: Molecules of Life

Slash Course and Cross-list Information:

Credit Hours

Minimum Credit / Maximum Credit: 3 to 3

Contact Hours: Lecture - Minimum Hours / Maximum Hours: 3 to 3

Contact Hours: Lab - Minimum Hours / Maximum Hours:

Contact Hours: Other - Minimum Hours / Maximum Hours:

Attributes

Is this course part of the LER, WIC or Diversity requirements: Yes

If yes, course attributes: 1. LBS-LER-Basic Sciences 2. 3.

Can this course be repeated for credit: No Repeat | **Course Limit:** | **OR Maximum Hours:**

Course Level: Undergraduate | **Grade Rule:** B-Standard letter

Rationale for an IP grade request for this course (if applicable):

Schedule Type(s): 1. LEC-Lecture 2. 3.

Credit by Exam: D-Credit by exam-department approval

Prerequisites & Descriptions

Current Prerequisite / Corequisite / Catalog Description:

Catalog Description (edited): An integrated introduction to molecular systems and their participation in the processes of life.

Prerequisites (edited): None

Corequisites (edited): None

Registration is by special approval only: No

Content Information

Content Outline:

Content Hours per Course Topic	Topic Description
2	Atomic Structure, Elements, and Compounds (classification of matter, element symbols, regions of the periodic table, subatomic particles, isotopes, atomic number and mass number, nuclear symbols, valence

	electrons, Lewis dot diagrams)
1	Math in Chemistry (chiefly integrated within topics; scientific notation, metric system, the mole, simple unit conversions)
4	Covalent Bonding and Organic Molecules (octet rule, names and formulas of covalent compounds, Lewis structures, geometry of covalent species, bond polarity, molecular polarity)
1	Intermolecular Forces and the States of Matter
2	Behavior of Gases (gas law calculations, solubility of gases, gases in the blood, role of oxygen in biological systems, simple balanced equations)
3	Organic Compounds (condensed and line-bond structures, functional groups, isomers, simple naming, polarity and reactivity)
2	Lipids (fatty acids, hydrophilic and hydrophobic interactions, triglycerides, formation of esters, lipid bilayers)
1	Amino Acids and Proteins (structure of amino acids, α carbon, stereocenters, chirality, Fischer projections)
2	Ions and Ionic Compounds (formation of ions, defining oxidation and reduction, polyatomic ions, formulas and names of ionic compounds)
2	Solution Chemistry (water as a solvent, solubility rules, electrolytes vs nonelectrolytes, molar concentration, osmotic pressure)
2	Acids and Bases (Arrhenius definition, pH scale, organic acids and bases, Ka and pKa)
3	Amino Acids and Proteins (pH and amino acid structure, levels of protein structure, interactions between protein side chains, protein structure and function)
3	Chemical Equilibrium and Buffers (dynamic nature of equilibrium, Kc, factors affecting equilibrium, buffer components, effect of pH change on buffers, buffers in the blood)
2	Energy in Chemical and Biochemical Reactions (energy transformations, chemical potential energy, heat of reaction, energy in a balanced equation, reaction rates, activation energy, reaction spontaneity, free energy)
4	Carbohydrates (monosaccharides, acetals, polysaccharides and glycosidic linkages, carbohydrate structure and function, energy from carbohydrates, glycolysis, ATP)
2	Redox Reactions in Biological Systems (redox processes and free energy, oxidative phosphorylation, coupling of

	spontaneous and nonspontaneous processes)
1	Radioactivity and Nuclear Medicine (nuclear stability, types of radiation, radiation and cellular damage)
2	DNA, RNA, and the Genetic Code (DNA, RNA, protein synthesis)
2	Receptor Interactions (enzymes, hormones, receptors, stereochemistry and shape, receptor interactions)
4	Cellular Information and Chemistry of Medicine (for example, hormones, histamines, membrane potentials, pro drugs and drug receptor interactions)

Display/Hide Delimited Course Outline

Total Contact Hours: 45

Textbook(s) used in this course: General, Organic, and Biological Chemistry 2nd edition; Frost and Deal (Pearson)

Writing Expectations: At least 4 quizzes, 3 intra term exams, and a final exam

Instructor(s) expected to teach: Chemistry faculty

Instructor(s) contributing to content: Leslie and Seed

Proposal Summary

Explain the purpose for this proposal:

This course is designed to fulfill the chemistry requirements for students entering the nursing program as well as serving as a Kent core course. The course will implement an integrated approach to an understanding of the fundamental chemical principles underpinning various key processes in living organisms.

Explain how this proposal affects program requirements and students in your unit:

The course will fulfill a Kent core requirement for students interested in the chemical basis of biological processes.

Explain how this proposal affects courses, program requirements and student in other units:

This course will replace the CHEM 10050 and CHEM 10052 sequence (5 credit hours) designed to fulfill the requirements of students entering the nursing program. The chemistry requirement for nursing students has recently been changed to 3 credit hours. We feel that the new course will serve the nursing students better than simply offering CHEM 10050. The nursing program fully supports the creation of the new course.

Explain how this proposal affects enrollment and staffing:

We anticipate that this course will appeal to a wider range of students seeking to fulfill a Kent core requirement as well as being the chemistry requirement for students entering the nursing program. We thus anticipate increased enrollment. It is not anticipated to impact staffing, as faculty currently teaching CHEM 10050 and CHEM 10052 will be teaching this course instead.

Units consulted (other departments, programs or campuses affected by the proposal):

Nursing, Biological Sciences, and Physics

Curriculum Services Information:

Approved by EPC:	**Curriculum Bulletin:**
Cross-list Banner Code:	**OBR Course Level:**
OBR Program Code:	**OBR Subsidy Code:**
CIP Code:	**Term Start:**
	Term End:

Comments (500 Character Maximum):

NOTE: Please do not use the following restricted characters: (~ * / \ --)

Approve | Return To Previous Approver | Deny

Comments:

Date	User	Comment
10/2/2014	Alexander J Seed	No comments available.

History:

Date	User	Status
12/15/2014	Donald F. Palmer	Approved
12/8/2014	Mary Ann Haley	Approved
10/3/2014	Michael J. Tubergen	Approved
10/2/2014	Alexander J Seed	Submitted