**1. Effective Semester:** Fall 2016

**2. College:** College of Science and Engineering

**3. Department/School/Program:** Chemistry and Biochemistry

<table>
<thead>
<tr>
<th>4. Prefix/Subject</th>
<th>Number</th>
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<tbody>
<tr>
<td>CHEM</td>
<td>4310</td>
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</table>

**5. Course Title:**

- **Proposed Long:** Medicinal Chemistry
- **Abbreviated (18 characters only including spaces):** MEDCHEM

**6. Course Description (complete sentences in 50 words or less):**

This course surveys modern approaches to drug discovery and mechanisms of drug action with the focus on molecular structures of drugs. Examples of drug discovery for the chemotherapy of cancer, microbial and cardiovascular diseases will be examined. Prerequisites: CHEM2342 and CHEM2350 or CHEM3375 or CHEM4375 with a grade of "C" or higher.

**7. Prerequisites (Including Minimum Grade Required):** CHEM 2342 and CHEM 2350 or CHEM 3375 or CHEM 4375 with a grade of "C" or higher.

**9. Restrictions:**

**8. Co-Requisites (Including Concurrent Enrollment Allowed):**
10. Course Data

Prefix/Subject and Number: CHEM 4310

CIP Code (10 digits - no spaces or periods)
5120040015

<table>
<thead>
<tr>
<th>Instruction Type</th>
<th>Lecture Contact Hours</th>
<th>Lab Contact Hours</th>
<th>Credit Hours</th>
<th>Repeatable for Credit?</th>
<th>Maximum Credit Hours Allowed</th>
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<tbody>
<tr>
<td>1-Lecture</td>
<td>☑</td>
<td>3</td>
<td>3</td>
<td>Yes</td>
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<td>2-Lab</td>
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<td>No</td>
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<tr>
<td>3-Practicum/Intmshp/Student Teaching</td>
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<td>4-Seminar</td>
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<td>5-Independent Study</td>
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<td>6-Private Lesson</td>
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<tr>
<td>8-Thesis</td>
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<td>9-Dissertation</td>
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<tr>
<td>0-Individualized</td>
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<tr>
<td>C-Clinical</td>
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Writing Intensive? | Topics Course?
Yes ☑ Yes ☑
No ☑ No ☑

Valid Grade Mode (choose only one)
(See PPS 4.07 for definitions.)

- Standard Letter ☑
- Credit/ No Credit
- Leveling/Assistantships/ESL
- Developmental

Course Equivalency(s) (Prefix and Number)

11. Justification for the course action:

Degree: BS
Major: Chemistry and Biochemistry

Minor: Chemistry and Biochemistry
Certificate:

Explain why the new course is needed.
There are a large number of pre-Health students at Texas State University. Currently, there is no course at our University that introduces students to the concepts of drug discovery or drug action.
12. Course Goals and Objectives:
   - Must be stated in measurable terms using action verbs. Please refer to Bloom's Taxonomy of Measurable Verbs.

Upon completion of the course students will be able to:
   - Describe the covalent and non-covalent interactions between drugs and their targets in the body.
   - Recall representative cardiovascular, antimicrobial, anticancer, central nervous system drugs and explain their respective mechanisms of action.
   - Explain the aspects of drug metabolism and the use of the prodrug approach to improve drugs' metabolic properties.
   - Dissect various drug resistance mechanisms, especially those involved in anticancer and antimicrobial therapies.
   - Articulate the challenges involved in the drug discovery process
   - Discuss current medicinal chemistry literature

13. Description of Instructional Methodologies:
   - Examples include lecture, discussions, group projects, role playing, simulations, modeling, field-based activities, writing, cooperative learning, inquiry, experimentation, product design, creative activities, case studies, seminars, internship activities, coaching, etc.

This course will be taught using the traditional lecture and textbook approach. This will be complemented with the analysis of recent literature publications illustrating the thought process of a medicinal chemist. At the end of the semester, the students will be asked to research an existing approved drug highlighting the aspects of its discovery, clinical applications, side-effects and its molecular mechanism of action. The students will present their findings in 20-min in-class presentations.

14. Assessment of Student Learning:
   - Examples include tests, projects, presentations, performances, creative works, papers, etc.
   - Must include percentages of total grade assigned.
   - Must have distinct differences between a graduate level course and an undergraduate course (in case of stacked courses).

Written exams will assess students' understanding of the materials covered in the lecture (3 x 25% = 75%). The research and in-class presentations will assess students' ability to apply the learned concepts to real life examples of drug discovery and drug action (25%).
15. Course Outline:
- Provide a weekly outline as appropriate for an example semester in which the course will be taught.

<table>
<thead>
<tr>
<th>Week 1</th>
<th>Week 9: DNA-Interactive Agents</th>
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<tbody>
<tr>
<td>Week 2: Lead Discovery and Lead Modification</td>
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<td>Week 3: Lead Discovery and Lead Modification</td>
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<td>Week 4: Receptors</td>
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<td>Week 5: Enzymes Exam 1</td>
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<td>Week 6: Enzyme Inhibition and Inactivation</td>
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<td>Week 7: Enzyme Inhibition and Inactivation</td>
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<td>Week 8: DNA-Interactive Agents</td>
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<tr>
<td>Week 10: Drug Resistance and Drug Synergism Exam 2</td>
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<td>Week 11: Drug Metabolism</td>
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<td>Week 12: Drug Metabolism</td>
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<td>Week 13: Prodrugs and Drug Delivery Systems</td>
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<td>Week 14: Presentations: students presenting on a drug of choice. The slides will be uploaded to TRACS.</td>
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<tr>
<td>Week 15: Presentations: students presenting on a drug of choice. The slides will be uploaded to TRACS. Exam 3 (includes material from lectures and presentations).</td>
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<td>Week 16 (Finals Week):</td>
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16. Suggested Textbook(s) and Other Learning Resources:
- Must list the required and/or recommended resources (e.g., relevant textbooks, course packets, websites), with complete bibliographical data (author, title, date and other publication data) in a standard academic format (e.g., CBE, APA, MLA, Chicago, etc.)


17. Bibliography:
• Must include literature other than required textbooks and other learning resources.

• Must demonstrate familiarity with current research. Ordinarily, the bibliography should include scholarship published during the last five years.

• Must conform to a standard academic format (e.g., CBE, APA, MLA, Chicago, etc.) Each bibliography will use only one format.


18. Approvals:

Department Chair/Program Director/School Director

Chair of College Curriculum Committee

Dean of College

Dean of The Graduate College (if applicable)

Chair of University Curriculum Committee (if applicable)

2/7/15

3/3/15

3/4/15

Date

Date

Date