### 1. Effective Semester: Fall 2016

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

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

### 4. Prefix/Subject Number

<table>
<thead>
<tr>
<th>Prefix/Subject</th>
<th>Number</th>
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<tbody>
<tr>
<td>CHEM</td>
<td>5310</td>
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### 5. Course Title:

<table>
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<tr>
<th>Proposed Long</th>
<th>Medicinal Chemistry</th>
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### 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.

### 7. Prerequisites (Including Minimum Grade Required):

### 8. Co-Requisites (Including Concurrent Enrollment Allowed):

### 9. Restrictions:
### 10. Course Data

<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>3</td>
<td>0</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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<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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<td>8-Thesis</td>
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<td>9-Dissertation</td>
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<td>0-Individualized</td>
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<td>C-Clinical</td>
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### Writing Intensive? | Topics Course?
- Yes [ ] Yes [ ]
- No [x] No [ ]

### Valid Grade Mode
(choose only one)
(See PPS 4.07 for definitions.)
- Standard Letter [x]
- Credit/ No Credit [ ]
- Leveling/Assistantships/ESL [ ]
- Developmental [ ]

### Course Equivalency(s)
(Prefix and Number)

### 11. Justification for the course action:
Degree: MS
Major: Chemistry and Biochemistry

Minor:
Certificate:

Explain why the new course is needed.
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
   - Develop critical thinking skills to analyze current drug discovery projects.
   - Dissect what went wrong with multiple related drug candidates that failed in clinical trials and understand how these problems were solved before their selected drug was approved for human use.

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 and then, based on the feedback obtained from the other students and the instructor, write a report on the same subject.

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 slacked courses).

Written exams will assess students' understanding of the materials covered in the lecture (3 x 20% = 60%). 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 (20%).

In addition, the written report that will be requested from students taking this class at the graduate level only will assess students' ability to apply the learned concepts to critical reading and analysis of medicinal chemistry literature (20%).
15. Course Outline:
   - Provide a weekly outline as appropriate for an example semester in which the course will be taught.

| Week 1: Introduction: The Basics of drug design and drug action | Week 9: DNA-Interactive Agents |
| Week 2: Lead Discovery and Lead Modification | Week 10: Drug Resistance and Drug Synergism |
| Week 3: Lead Discovery and Lead Modification | Exam 2 |
| Week 4: Receptors | Week 11: Drug Metabolism |
| Week 5: Enzymes | Week 12: Drug Metabolism |
| Exam 1 | Week 13: Prodrugs and Drug Delivery Systems |
| Week 6: Enzyme Inhibition and Inactivation | Week 14: Presentations: students presenting on a drug of choice. The slides will be uploaded to TRACS. |
| Week 7: Enzyme Inhibition and Inactivation | Week 15: Presentations: students presenting on a drug of choice. The slides will be uploaded to TRACS. |
| Week 8: DNA-Interactive Agents | Exam 3 (includes material from lectures and presentations). |
| | Week 16 (Finals Week): Report Due |

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)

Date

Date

Date

Date