

# Bachelor of Science Chemistry Interdisciplinary Chemistry Track -NewTrk-2016-01-19

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## Form Information

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**First Step:** **ONLY** change the text in the [brackets] so it looks like this: **Bachelors in Criminology Pre-Law-NewTrk-2015-08-10**

- ***If DUAL LISTED list BOTH courses in the page title***

**Second Step:** Click “SAVE” on bottom right

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**Third Step:** Make sure the word ***DRAFT*** is in yellow at the top of the proposal

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*\*Indicates a required field*

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Proposing Department/Unit*	Chemistry	Contact Phone*	7-4489

(A) Track Title: *	Interdisciplinary Chemistry
(B) Degree Designation:*	Bachelor of Science
(C) Program Name:*	Chemistry
(D) List number of credits:*	
(E) Course Level:*	undergraduate-level

<p><b>(F) Narrative Catalog Description:*</b></p>	<p>Degree programs offered by the Department of Chemistry are the Bachelor of Science (BS) in Chemistry and the BS in Education – Chemistry. Additionally, Pre-medical, Pre-pharmacy and Interdisciplinary tracks are available in the BS program. Preparatory programs for other professional schools can also be developed, using the Interdisciplinary track, and a minor in chemistry is offered.</p> <p>Chemistry is a field that has historically enjoyed very strong career possibilities. Many students are employed directly after their undergraduate education by the chemical, pharmaceutical or related industries, in jobs that have excellent career prospects. Graduate school in chemistry or biochemistry usually includes very generous financial support, and can lead to outstanding career paths in industry, government or academic areas. These opportunities are available to students completing any of the degree programs offered by the IUP Department of Chemistry, and graduates of these programs have gone on to industrial leadership positions, and some of the most prestigious graduate programs in the country.</p> <p>The BS degree in Chemistry is designed for a student intending a career in chemistry and is certified by the American Chemical Society. The advanced courses and strong laboratory component in this degree program gives the student excellent preparation for the challenges of employment or graduate school.</p> <p>The Pre-medical and Pre-pharmacy tracks of the BS degree allow students to take all courses required for entrance into their intended professional health program, and gives them the flexibility to tailor their program to meet their individual needs. Students in these tracks retain the option of: a) attending medical or pharmacy school; b) attending graduate school in chemistry, biochemistry, pharmacology, or a variety of medically-related Ph.D. programs; c) employment in the chemistry or pharmaceutical industry. Additionally, the flexibility of these tracks allows students to change the focus of their degree program during their undergraduate experience.</p> <p>The curriculum leading to the BS/Interdisciplinary Chemistry Track is designed to allow for the workable union of other disciplines with chemistry in such a way as to retain the fundamental science and mathematics requirements needed for a career in chemistry. The Interdisciplinary Chemistry Track can also provide excellent preparation for entrance into a variety of professional schools, including law school – students considering this path should work closely with their advisor to choose courses appropriate to meet professional school requirements. This degree may be of interest to students who have completed a significant number of credits in another degree program and decide they want to earn a degree in chemistry. The Interdisciplinary Chemistry Track can incorporate a minor from almost any other field in the university; some disciplines that make useful combinations include art, biology, business administration, computer science, criminology (forensic science), English (technical writing), geoscience, government and physics. In particular, a student seeking a career in forensic science should major in chemistry.</p> <p>The curriculum leading to the BS in Education degree in chemistry is designed to prepare the student to teach chemistry at the secondary school level. Upon completion of the specified course work and the requirements of the teacher certification process, the student is eligible for Pennsylvania certification by the Pennsylvania Department of Education.</p>
<p><b>(G) List of Program Requirements in catalog layout including course numbers, titles, credits and any footnotes.*</b></p>	<p><b>Bachelor of Science – Chemistry / Interdisciplinary Chemistry Track</b></p>

<b>Liberal Studies: As outlined in the Liberal Studies section with the following specifications:</b>		<b>44</b>
<b>Mathematics: MATH 125 (1)</b>		
<b>Natural Sciences: PHYS 111/121 and 112/122 or 131/141 and 132/142</b>		
<b>Liberal Studies Elective: 3cr, MATH 126 (1), no course with CHEM prefix</b>		
<b>Major:</b>		<b>35-</b>
<b>Required Courses:</b>		<b>37</b>
<b>CHEM 111 General Chemistry I or CHEM 113 Advanced General Chemistry I</b>		<b>4cr</b>
<b>CHEM 112 General Chemistry II or CHEM 114 Advanced General Chemistry II</b>		<b>4cr</b>
<b>CHEM 214</b>	<b>Intermediate Inorganic Chemistry</b>	<b>3cr</b>
<b>CHEM 231</b>	<b>Organic Chemistry I</b>	<b>4cr</b>
<b>CHEM 232</b>	<b>Organic Chemistry II</b>	<b>4cr</b>
<b>CHEM 290</b>	<b>Chemistry Seminar I</b>	<b>1cr</b>
<b>CHEM 325</b>	<b>Analytical Chemistry I</b>	<b>4cr</b>
<b>CHEM 341</b>	<b>Physical Chemistry I</b>	<b>4cr</b>
<b>Controlled Electives:</b>		
<b>CHEM 343 (1cr) or 390 (1cr) and 490 (2cr) (2)</b>		<b>1-2cr</b>
<b>BIOC 301 (3cr) or CHEM 351 (4cr)</b>		<b>3-4cr</b>
<b>At least 3cr additional CHEM or BIOC courses at the 300-level or above. (3)</b>		<b>3cr</b>
<b>Other Requirements:</b>		<b>25</b>
<b>BIOL 202</b>	<b>Principles of Cell and Molecular Biology</b>	<b>4cr</b>
<b>One course from the following: MATH 171, 216, 225 or 241</b>		<b>3cr</b>
<b>Minor (or second major) in a field outside chemistry. (4)</b>		<b>18cr</b>
<b>Free Electives: (2)</b>		<b>14-16</b>
<b>Total Degree Requirements:</b>		<b>120</b>

(1) For students transferring into the program, MATH 121 and 122 may be substituted for MATH 125 and 126, respectively.

(2) Program contains one writing-intensive credit; students need to acquire another W-credit in Liberal Studies, or as a free or controlled elective.

(3) CHEM 343, 390 and 490 can all be taken, but student still requires at least 1cr additional of CHEM or BIOC courses at the 300-level or above. BIOC 301 and CHEM 351 cannot both be taken.

(4) A pre-law concentration has been established – information on this and suggested minor programs is available on the chemistry department website. Alternate (non-minor) programs containing at least 18cr are also possible – they must be approved by the advisor and department chair.

**(H) Student Learning Outcomes\***

Student Learning Outcomes for the Bachelor of Science – Chemistry / Interdisciplinary Chemistry Track

**Objective 1:**

Students will demonstrate preparation for application to pharmacy school, graduate school in chemistry or employment in the chemical industry.

**Rationale:**

Curriculum has been designed with emphasis on meeting the specific expectations of medical schools, but also incorporates the courses expected by graduate schools of chemistry and chemical employers.

**Objective 2:**

Students will demonstrate the ability to analyze data and scientific arguments.

**Rationale:**

Course content throughout the program, in both lecture and laboratory courses, support this objective by requiring students to respond to questions at the application, analysis and synthesis levels.

**Objective 3:**

Students will show the ability to synthesize and apply concepts from multiple sub-disciplines of chemistry.

**Rationale:**

Course content in the advanced chemistry courses requires a foundation knowledge across the breadth of chemistry. Advanced courses, seminar courses and undergraduate research require students to apply concepts from a variety of courses in novel ways.

**Objective 4:**

Students will be able to work with peers to solve complex, multi-step problems.

**Rationale:**

Starting with General Chemistry, all chemistry lecture courses require higher-level quantitative problem-solving ability. In laboratory courses, students often work in small groups, and are required to transfer the problem-solving strategies learned in the classroom to real-world, hands-on situations.

**Objective 5:**

Students will demonstrate the ability to communicate answers and scientific reasoning clearly, in both written and oral forms.

**Rationale:**

Laboratory reports and oral presentations require students to learn and master the ability to communicate in the context of scientific discourse.

**Objective 6:**

Students will progressively develop effective and safe chemistry laboratory skills that require the methods and instrumentation of modern chemistry.

**Rationale:**

As students progress, laboratory course content requires an increasing level of synthesis and evaluation, with a greater emphasis on procedure development and independent thinking. Throughout the laboratory experience, safety is stressed and students are expected to critically analyze procedure for safety and effectiveness.

Assessment

There are two components proposed for the periodic assessment of this degree program:

*Senior Survey*– A questionnaire will be given to students who are in the last semester of their degree program. This questionnaire will address the graduates' perceptions of whether they have achieved the program learning outcomes set by the Chemistry Department. It will also have the students indicate where they plan to go once they leave IUP, and the strengths and weaknesses of the program.

*DUCK Exam* - Students in their last semester will be given the Diagnostic of Undergraduate Chemical Knowledge (DUCK) exam provided by the American Chemical Society's Exam Institute. The student's scores will be compared to the published national norms for this exam.

#### Rationale for Proposal

**(I) Why is this track being**

**proposed?\***

The BS in Chemistry / Interdisciplinary Chemistry Track is intended to meet a variety of student needs: a) students who are interested in the interdisciplinary possibilities of combining chemistry with another academic area; b) students who are unable to complete the ACS-certified BS degree program in a timely manner, possibly due to transfer from another institution or a change of major; c) students who wish to design their own program to prepare themselves for a specific professional school or career path. The BS in Chemistry / Interdisciplinary Chemistry Track is intended as a replacement for the BA in Chemistry. The existing BA program (which will be deleted once this proposal is approved) required 42 cr of science courses, plus a 15 cr "complementary field," so it was overloaded for a BA degree, and the proposed Interdisciplinary Chemistry BS program requires at least 60 cr, which is in keeping with the BS degree guidelines. Additionally, this change from the BA to the Interdisciplinary Chemistry BS offers significant improvements for both the students and the department. For students, they will be earning a Bachelor of Science degree, which is more appropriate for a science major, and the requirement of a minor or second major is better defined than the complementary field requirement in the BA degree. For the department, all the majors (other than those in BS in Education – Chemistry) will be collected in various tracks of a single degree program, rather than split between BA and BS degrees. Finally, it is hoped that this replacement of the BA with the Interdisciplinary Chemistry BS will make this program more attractive to students who are considering chemistry as part of their career plans but, for whatever reason, are not able to make the commitment to the traditional BS in Chemistry program.

**(J) What role, if any, does it serve the**

**College /University above and**

**beyond the role it serves in the**

**\* department?**

As the Interdisciplinary Track of the BS in Chemistry requires a minor or second major, it should lead to students doing significant coursework outside the chemistry department, and in some cases, outside the College of Natural Science and Math. In addition to biology, computer science, geoscience, math and physics, some students in this track may pursue a minor or second major in fields as diverse as art, business administration, criminology, English, philosophy or political science. Additionally, since patent law requires an undergraduate science degree, chemistry students interested in this career path may minor in an appropriate field, or follow the Pre-Law concentration (below) that has been established by the chemistry department.

#### Pre-Law concentration

PHIL 122	Contemporary Moral Issues
PLSC 111	Power and Democracy in America
any 4 of the following:	
PHIL 323	Political Philosophy
PHIL 325	Early Modern European Philosophy
PHIL 330	Philosophy of Science
PHIL 450	Philosophy of Law
PLSC 351	Legislative Process
PLSC 358	Judicial Process
PLSC 359	Constitutional Law and Civil Liberties
PLSC 361	Modern Political Thought

**For Deans Review**

Are Resources Available/Sufficient for this Course?

Is the Proposal Congruent with the College Mission?

Has the Proposer Attempted to Resolve Potential Conflicts with Other Academic Units?

Comments:

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