11-45

Natural Sciences and Mathematics College Curriculum Committee Response to WorkForce Development Proposals 10/14/11

Date: Oct 14, 2011

Natural Sciences and Mathematics College Curriculum Committee Faculty Members: Terry Fries, Anne Kondo (chair), Sandra Newell, Michael Poage, Edel Reilly, Stan Sobolewski

Re: Workforce Development Plan

The Natural Sciences and Mathematics (NSM) College Curriculum Committee (CCC) has reviewed the Workforce Development (WFD) plan and the responses of the affected departments to the proposals. This letter comprises our response to the WFD plan, and a review of the departments' responses.

The following is a list of the college programs under review, the action recommended for each program, and the brief justification given by the administration for each action.

Program	**Action**	**Administration's Justification**
BIOL BA	Moratorium	Similar to BS with fewer Bio courses and a 15 cr. requirement in a complimentary area, BA students could potentially shift to BS
BIOL ENVH	Discontinue	Department moved and approved AY10/11 as a track within BS
CHEM BA	Moratorium	Similar to BS with fewer Chem courses and a complimentary area, BA students could shift to BS
CHEM MA	Moratorium	Proposal for new PSM in Applied and Industrial Chemistry is being developed
CHEM MS	Moratorium	Proposal for new PSM in Applied and Industrial Chemistry is being developed
CHEM PMED BA	Moratorium	Similar to CHEM BA
SDR MS	Moratorium	Contract program already eliminated
APMA BS	Discontinue	Department moved and approved AY10/11as a track within BS
ELMA MED	Moratorium	Similar to Math Ed. M.Ed.
MAED MED	Moratorium	Teacher certification changes impact this major
APPY NMT	Moratorium	Put in moratorium by PASSHE in 2010
APPY	Discontinue	Department moved and approved as track within BS
EOPT AAS	Discontinue	Department revised AS, students potentially could shift to AS
PHYS BA	Discontinue	Department eliminated program
PHYS MA	Discontinue	Proposal for new PSM in Nanoscience for Industrial Materials
PHYS MS	Moratorium	Proposal for new PSM in Nanoscience for Industrial Materials
PSYC APPL	Moratorium	Has been closed to admission for over four years

The NSM CCC found, without exception, that the department responses were thoughtful, constructive, and persuasive. We will first address common misconceptions about science programs that were evident in the Workforce Development plan, and then we will address the arguments to save particular programs where it is merited.

Misconceptions about Science and Mathematics Programs

Three major misconceptions for moratoriums are found throughout the Workforce Development plan:

Misconception # 1: Cutting a program will save money

A common theme arguing for moratoriums is that cutting B.A. programs or degrees is a cost-cutting measure. In each case in our college, the program is either revenue neutral or revenue producing. For each program being considered for moratorium, no additional faculty are needed to continue the program. Students take courses which are already offered for other programs and/or degrees. Extra lecture or laboratory sections are not added to accommodate B.A. students in any of the majors' courses of the affected departments. Instead, these B.A. students fill what would otherwise be empty places in sections that would be offered anyway. Since the courses will be offered regardless of whether a moratorium is established in the B.A., it makes economic sense to fill these seats. Otherwise, the cost of delivering the sister B.S. will *increase* with respect to Faculty FTE per student. Thus, the threatened programs are actually revenue-producing because they fill seats in classes that have capacity, and they help sustain other programs. If these B.A. programs are not offered at IUP, some of the students would decide to attend a different university that offers the program, thus reducing tuition revenue at IUP.

Similar comments apply at the Master's level, for example, the ELMA MED program offered in the Mathematics Department. During the fall and spring semesters, all of the courses that these graduate students take are dual-level courses, offered with the new undergraduate middle level mathematics program, a program not in moratorium. The graduate students occupy spaces not filled by undergraduates. All of these dual-level courses will continue to be offered even if the ELMA MED is placed in moratorium, resulting in a potential loss of tuition revenue between $61,000 to $100,000. It is noted that during the summer, these graduate students take 600 level courses. For the past four summers, the enrollments in these courses have consistently averaged 14 students. All summer courses that ELMA students take are self-sufficient. As with all summer courses offered in the Math Department, if there are not enough students registered to cover the expense of running the course, the course will not run.

Conclusion: placing BA degrees, or the ELMA MED, in moratorium will cost IUP revenue, and reduce the viability of degrees with common courses.

Misconception # 2: Shifting B.A. students to B.S. degrees is not difficult

As detailed, for example, in the responses of the Biology and Chemistry departments, the B.A. is a separate and distinct degree from the B.S. A B.A. requires about twenty fewer credits of upper level science or ancillary science courses than a B.S.. For transfer students or students who change their majors after their sophomore year, a B.A. ensures that they can graduate within four years, and that the courses of their prior major can count towards their complementary field. Without the B.A. degrees, such students could be looking at (a) leaving IUP without a degree or (b) requiring an additional one to two years of university education to complete their first degree. Either route has a negative impact on IUP's performance indicators.

Conclusion: It is not easy for a student to shift from a B.A. degree to a B.S. degree.

Misconception # 3: A B.A. is not unique from a B.S. degree

One common thread throughout the Workforce Development Plan is the perception that the B.A. is similar to the B.S. degree. In the Sciences, the two degrees have distinct purposes but equal validity. The B.A. has fewer requirements in its major discipline than a B.S., but this difference allows students much more flexibility in tailoring their degrees to their interests. Combining the B.A. with a dual major in another field provides students with a wider variety of employment options when they graduate. A B.A. is an alternative degree to a B.S. The response by the chemistry department gives several examples of specific students whose lives have been impacted by the opportunity to pursue a B.A. instead of a B.S. Those departments seeking to preserve their B.A. degrees are working to better define, tailor and advertise their B.A. degrees to increase enrollment, as discussed in their individual responses.

Conclusion: A B.A. is a worthy degree in its own right, and departments are implementing plans to better define and improve recruitment to these degrees.

BIOLOGY

Having reviewed the Workforce Development Plan and the response of the Biology department to the proposal to place the B.A. in Biology in moratorium, the College of Natural Sciences and Mathematics Curriculum Committee **opposes** the proposal to place the B.A. in Biology in moratorium for the following reasons:

- The B.A. in Biology is a revenue-positive program because:
  - students take the same core courses in biology as students in the B.S. program (i.e., no courses will be eliminated with the elimination of the program);
  - B.A. students take fewer electives in biology and the ancillary sciences (i.e., B.A. students cost less because they take fewer lab courses);
  - students in the program may leave IUP to get the B.A. degree elsewhere thereby reducing the tuition income and number of students in the core biology courses.

- The B.A. in Biology is a flexible program that allows for:
  - an individualized program with a broad scope;
  - interdisciplinary studies (i.e., a 15-credit complementary field allows a student to more easily combine biology with a second major or a minor in another discipline);
  - an easier transition for transfer students, making it more feasible for students coming from community colleges to earn a degree in biology.

CHEMISTRY

Having reviewed the Workforce Development Plan and the response of the Chemistry department to the proposal to place the B.A. in Chemistry (B.A. CHEM PREM) in moratorium, the College of Natural

Sciences and Mathematics Curriculum Committee **opposes** the proposal to place the B.A. in Chemistry (comments equally to the B.A. CHEM PREM) in moratorium for the following reasons:

- The CHEM B.A. does not cost additional resources above a CHEM BS; indeed the BA appears to require fewer lab resources than the BS. Furthermore, the BA students help fill the upper level CHEM courses, making more effective use of faculty resources.

- The CHEM B.A. increases flexibility and access to educational opportunities at the undergraduate and (potentially) graduate level. It properly prepares students for careers, graduate school and medical school, and allows them to graduate in a timely manner. A list of recent B.A. graduates illustrates the value of the degree.

- The CHEM B.A. has the potential to provide a multidisciplinary approach to chemistry in a vast array of complementary fields. The Chemistry Department is working to better define potential complementary fields to help expand enrollment in the program. The program should continue while this work progresses.

- The CHEM B.A. has the potential to expand with significant growth, given the opportunity for marketing/promotion. The program should continue while this work progresses.

- The CHEM B.A. is being carefully reviewed as part of the current department program review. The program should continue while this work progresses.

- The Chemistry department is developing a CHEM-PSM program that would clearly serve the CHEM B.A. graduate. B.A. CHEM majors are an obvious source of potential customers. The coordination between programs should be fostered rather than eliminated.

- The CHEM B.A. program that has no additional cost impact on the university, provides flexibility to students, enhances the diversity of students in the B.S. CHEM courses, and has a high potential for growth.

Having reviewed the Workforce Development Plan and the response of the Chemistry department to the proposal to place the M.S. in Chemistry in moratorium, the College of Natural Sciences and Mathematics Curriculum Committee **opposes** the proposal to place the M.S. in Chemistry in moratorium for the following reasons:

- Significant progress has been made on the development of a Professional Science Masters Degree. PASSHE has accepted this new program in principle, which is now under curricular development. It would help the new program to be launched from an existing program, and thus the department requests that the M.S. not be placed in moratorium, but be permitted to transform into the PSM.

MATHEMATICS

Having reviewed the Workforce Development Plan and the response of the Mathematics department to the proposal to place the ELMA MED in moratorium, the College of Natural Sciences and Mathematics Curriculum Committee **opposes** the proposal to place the ELMA MED in moratorium for the following reasons:

- Potential revenue loss would range from $61,000 to $100,000
- Every course taught during the fall and spring is a dual level course offered with a program not in moratorium. Graduate Students fill what would otherwise be empty seats.
- Graduate 600 level courses are taught during the summer and are self-sufficient.
- Average class size for these 600 level courses for the last 4 summers has been 14 students.
- Most ELMA MED students, because they are also in-service teachers, are part-time. This fact results in the appearance of a low-enrolled program in the fall and spring semesters, because most take only one or two courses during the regular academic year.
- Current program fulfills the Pennsylvania Department of Education (PDE) new requirements for Level 2 teacher certification, and as such is an important contribution to the community.
- Co-coordinators have embarked on an extensive recruitment campaign.

Having reviewed the Workforce Development Plan and the response of the Mathematics department to the proposal to place the MAED MED in moratorium, the College of Natural Sciences and Mathematics Curriculum Committee **supports** the proposal to place the MAED MED in moratorium, during which time a committee will:

- Will revise and convert the existing program to **an online program**
- Align the program with new PDE requirements for continuing Level II certification

PHYSICS

Having reviewed the Workforce Development Plan and the response of the Physics department to the proposal to discontinue or place in moratorium multiple undergraduate physics degrees, the College of Natural Sciences and Mathematics Curriculum Committee **notes** the following:

- Nationwide, most universities graduate a handful of physics majors. Compared to most institutions, IUP's Physics department is not low-enrolled. All of the current programs are above average in size.
- Students who are in the programs designated for elimination take the same classes as the other physics programs, so these programs do not incur additional costs. They may even bring in a few extra students.
- Some of the programs (designated as low-enrolled) have been subsumed into the other programs. These revised programs are progressing through the curriculum approval process.
- Nanotechnology Manufacturing Technology is a new field with potential for much growth. There has been significant investment nationwide into this area, and the future for NMT is positive. Students enrolled in this program are sure to find technical employment.

Having reviewed the Workforce Development Plan and the response of the Physics department to the proposal to discontinue the M.A. and place the M.S. in moratorium, the College of Natural Sciences and Mathematics Curriculum Committee **approves** the proposal to discontinue the M.A. and **opposes** placing the M.S. in moratorium for the following reasons:

- The NSM CCC encourages the Physics department to continue developing a PSM. The existing M.S. should continue in order to facilitate the transition to the PSM.

- The IUP M.S. in Physics contributes toward the department by enhancing the academic environment, as well as department resources. More than $300,000 in grant money has been brought in by faculty who attracted to IUP because there is an M.S. program. A graduate level program should be permitted to continue.

PSYCHOLOGY

Having reviewed the Workforce Development Plan and the response of the Psychology department regarding the moratorium status of the PSYC APPL degree, the College of Natural Sciences and Mathematics Curriculum Committee **supports** the department's position to leave the degree in moratorium for the following reasons:

- The department initiated the original moratorium four years ago.

- The department will revise the program by Fall 2013.

- The revised program will be a way of attracting more students to IUP and a way of developing the department's curriculum.

The criteria for closing/placing a program in moratorium - appropriateness to mission, need, coordination with other programs, periodic assessment, resource sufficiency and impact on educational opportunity - are addressed in general below.

Appropriateness to Mission

The science and mathematics degrees threatened with moratorium meet the criteria of Appropriateness to Mission as they all foster access to science with the opportunity to succeed, involve engaged learning, and have a student-centered emphasis, particularly where a complementary area is permitted. The BA degrees in Biology, Chemistry and Physics, and the Master's degrees in Chemistry, Math and Physics all meet the strategic goal of "student development and success to ensure the growth and development of the whole person". The flexibility of the complementary field at the bachelor's level, and the opportunity to continue one's education beyond a bachelor's degree all have a student-centered emphasis that encourages academic, intellectual and professional growth.

Conclusion: The College of Natural Sciences and Mathematics Curriculum Committee finds the threatened degrees still meet the criterion of "appropriateness to mission".

Need

The United States, the Commonwealth of Pennsylvania and the Pennsylvania State System of Higher Education have all articulated the need for a scientifically and technologically fluent workforce. While B.S. and M.S. degrees fulfill this need at a focused, advanced level, B.A. degrees produce scientifically competent workers with a more diverse background: these degrees are suitable for entry level positions. The ELMA MED and MAED MED degrees will be important as Pennsylvania changes its requirements for teacher training. The move towards on-line offerings will expand the potential audience for this degree.

Conclusion: The College of Natural Sciences and Mathematics Curriculum Committee finds the threatened degrees still meet the criterion of "need".

Coordination with Other Programs

The complementary areas of the different BA degrees provide the opportunity for developing more coordination with other programs. The NSM CCC encourages the departments to actively pursue coordination amongst their degrees. The departments developing PMS degrees will benefit from a feeder effect from the BA degrees, and are also encouraged to pursue coordination amongst their degrees.

Conclusion: The College of Natural Sciences and Mathematics Curriculum Committee finds the threatened degrees, with increased collaboration between departments, can meet the criterion of "coordination with other programs".

Periodic Assessment

All programs undergo a five-year periodic assessment. Some degrees undergo additional assessment of an external accrediting agency. Periodic assessment provides departments with the opportunity to review their degrees and their marketing strategies, as is discussed in several department responses.

Conclusion: The College of Natural Sciences and Mathematics Curriculum Committee finds the threatened degrees meet the criterion of "periodic assessment".

Resource Sufficiency

Departments opposing moratoria made compelling arguments about the positive aspects of these degrees. In all cases, the lecture and laboratory sections would be offered regardless of the moratorium, but the presence of students in the sister degrees fills sections, and reduces the faculty FTE cost of the courses. No additional resources are consumed by maintaining these degree offerings; halting these degrees raises the faculty FTE costs of upper level science courses. As discussed in individual department responses, the affected departments are focusing on recruitment and marketing efforts to increase enrollment in these degrees.

Conclusion: The College of Natural Sciences and Mathematics Curriculum Committee finds the departments are responding to issues of resource sufficiency.

Impact on Educational Opportunity

BA degrees provide science majors with flexible, interdisciplinary degree programs. The combinations of the major science courses with courses that particularly interest a student, produce a well-rounded, highly employable individual. In addition to being valuable degrees in their own right, the B.A.s provide a mechanism for students who change majors, who pursue a double major or who transfer to IUP to graduate with a science degree within a four year period. This market pool would become largely

untapped in the sciences without the B.A.s, as students go to other universities. Alternatively, some students may pursue the B.S., but will likely take more than four years to graduate.

The Masters degrees in Chemistry and Physics are being transformed into Professional Science Masters, to address the need for education beyond the bachelor's. These degrees expand student knowledge, incorporate a work-experience, and do not require a thesis. The Masters degree in Math, which is moving to on-line delivery, will address changes in the educational requirements of teachers.

There are intangible costs and benefits to having graduate programs in the Sciences. Having Masters students, whether in a research program or in classes, tends to prompt faculty to be more engaged in research. In other words, Masters Degrees enhance the teacher-scholar model of IUP. A Masters program enhances the professional climate of a department; it encourages faculty to bring in better speakers; it elevates the level of research and research activity in a department; it exposes pre- or in-service teachers to other teachers, and as such is a service to the community; it helps departments achieve the critical mass that is necessary for team research and in gaining grants. For the Masters students, the degree provides excellent technical experience (for example, in preparing chemicals for undergraduate laboratory experiments) that is also a service to the department. The presence of Masters students provides mentors for undergraduate students, and expands their vision of possibilities for themselves. While we understand that it is not acceptable for a program to lose money, the benefits listed above warrant supporting these programs that are seeking to improve enrollments.

Conclusion: The College of Natural Sciences and Mathematics Curriculum Committee finds the threatened degrees meet the criterion of having a significant "impact on educational opportunity".

In summary, the Natural Sciences and Mathematic College Curriculum Committee recommends the following actions:

Program	**Proposed Action**	**NSM CCC Recommendation**
BIOL BA	Moratorium	Opposed
BIOL ENVH	Discontinue	Approved AY10/11 as a track within BS
CHEM BA	Moratorium	Opposed
CHEM MA	Moratorium	Opposed (Proposal for new PSM in development)
CHEM MS	Moratorium	Opposed (Proposal for new PSM in development)
CHEM PMED BA	Moratorium	Opposed
SDR MS	Moratorium	Contract program already eliminated
APMA BS	Discontinue	CCC approved AY10/11as a track within BS
ELMA MED	Moratorium	Opposed
MAED MED	Moratorium	Approved
APPY NMT	Moratorium	(Put in moratorium by PASSHE in 2010)
APPY	Discontinue	CCC approved as track within BS AY 10/11
EOPT AAS	Discontinue	CCC approved revision of AS AY 10/11
PHYS BA	Discontinue	CCC approved elimination of program AY 10/11
PHYS MA	Discontinue	Approved (Proposal for new PSM in development)
PHYS MS	Moratorium	Opposed (Proposal for new PSM in development)
PSYC APPL	Moratorium	Approved

22 September 2011

B.A. in Biology at IUP – Biology Department Response

The Department of Biology opposes the proposal to place the B.A. in Biology in moratorium.

Appropriateness to Mission

The Bachelor of Arts degree with a major in Biology is designed for students who wish to combine a primary academic interest in Biology with a secondary interest in a complementary field. Through the choice of complementary field and free electives, the curriculum allows the greatest overall flexibility in a student's program of study. Compared to the B.S. in Biology, which emphasizes training in the natural sciences, the B.A. requires fewer credits in the major (32 vs. 38) and fewer credits in Ancillary Sciences (4-5 vs. 20-21). The B.A. requires a 15 credit complementary field that is not required in the B.S. and offers a student the opportunity to take up to 17 credits of free electives within the 120 credit mandate as opposed to 10 credits in the B.S. program. Combined, the complementary field plus free elective credits provide sufficient flexibility for a student to earn a minor or a double major in a second academic discipline over a time frame of eight academic semesters. Rather than locking a student into a narrowly focused program, the B.A. in Biology allows a student to define a program of study that is more personalized, more cross-disciplinary, and more appropriate to some long-term career goals.

The flexibility and freedom of choice that are inherent in the B.A. program help it to support IUP's mission, as defined in the President's Strategic Plan "Advancing a Legacy of Excellence", in several ways. First, the B.A. helps the Biology Department to address Overarching Strategic Goal #1: Academic Excellence because it provides students with an opportunity to design a distinctive and rewarding individualized academic program. Second, it offers student the freedom to take advantage of long-term international learning opportunities. The B.A. also helps the Biology Department to address Overarching Strategic Goal #2: Student Development Success because students in the B.A. program have more opportunities for experiential learning. In a more general sense, the B.A. in Biology program addresses that part of the IUP mission that seeks to engage "students as learners and leaders in an intellectually challenging, culturally enriched, and contemporarily diverse environment".

Of the 14 PASSHE schools, seven (including IUP) offer the B.A. in Biology, indicating that this degree program fits the System mission. Edinboro, IUP, Millersville and West Chester offer only a general B.A. in Biology. East Stroudsburg and Slippery Rock offer two B.A. in Biology tracks and Bloomsburg offers three. If the B.A. in Biology were not an option at IUP, prospective students might enroll these other PASSHE universities instead of IUP.

Need

Over the last two decades, government, non-government and private agencies, boards, groups and individuals in the United States have articulated the national need for a technologically trained workforce in order to remain competitive in the global economy. The Commonwealth and the System echo this position. With respect to biology in particular, the US Department of Labor predicts that job growth in the biological, medical, agricultural and

conservation sciences will be as great or greater than average through 2018. They cite a bachelor's degree as the minimum qualification in this job market. Thus, the B.A. in Biology is appropriate preparation for entry level positions.

Currently, enrollment in the B.A. Biology program is lower than it has been in the past. This may be the result of significant enrollment increases in the College's pre-professional programs that have diverted our attention and our efforts from our own Department's offerings. We think that with additional marketing and recruiting the program can return to historic levels of enrollment. One strategy might be to attract students to the B.A. program by developing specific packages of controlled Biology electives or tracks using the Bloomsburg model as an example.

Academic Integrity

Students who elect the B.A. in Biology take the same six core biology courses as students in the B.S. in Biology. They choose Biology electives from the same lists and schedules as well. Students who elect the B.A. in Biology take the same Ancillary Science courses as students in the B.S. in Biology. However, B.A. students do take fewer Biology elective classes and fewer Ancillary Science classes than B.S. students. Students who elect the B.A. in Biology take the same MATH courses as students in the B.S. in Biology and they have the same Foreign Language requirement. For that matter, B.A. in Biology students take many of the same science and math courses as other majors in the College of Natural Sciences and Mathematics (e.g. Biochemistry, Chemistry or Natural Sciences Pre-Professional). Thus, the B.A. in Biology is as rigorous as the B. S. in Biology or any other major in the College.

Coordination with other Programs

By including 15 cr of a complementary field, the B.A. in Biology fits in well with many other programs at IUP, including programs outside the College of Natural Sciences and Mathematics. Each individual B.A. in Biology student, in consultation with the Biology advisor, selects a complementary field, which may include a minor or a second major in the complementary discipline. Coordination with these other programs, departments and disciplines is handled on a case-by-case basis.

Periodic Assessment

The B.A. in Biology is assessed at the same time and with the same process as all other programs in the Biology Department. The most recent review was completed in 2008.

Resource Sufficiency

Students who enroll in the B.A. in Biology take the same Biology and Ancillary Science courses (although fewer of them) than students who enroll in the B.S. program. There are no extra or special or dedicated courses for B.A. in Biology students. There is no one course that might disappear if the B.A. in Biology did not exist. There is no faculty complement that is

specific to the B.A. in Biology program. As long as IUP has the B.S. in Biology program, there are no additional expenses associated with the B.A. program. In fact, because B.A. in Biology students enroll in fewer laboratory courses they are less expensive over eight semesters than B.S. students.

By offering them an opportunity to develop an individualized, interdisciplinary program of study, the B.A. in Biology attracts students who might not otherwise choose IUP. This statement is based on many conversations with prospective students and their families at numerous EXPOs and other recruiting events over the last ten years. If these prospective B.A. in Biology students enrolled at some other institution, one result would a loss of their tuition revenue for IUP.

The B.A. in Biology attracts a number of students to IUP. They are relatively low-cost students because they take fewer lab courses than other Biology majors. Thus the B.A. in Biology is not a "revenue-neutral" program. It is a "revenue-positive" program.

Impact on Educational Opportunity

The real educational impact of the B.A. in Biology lies in its unique interdisciplinary emphasis and personalized structure. Combined, these allow the B.A. program to offer a better educational experience for than the B.S. for many of our students.

Many studies indicate that all learning is based on prior learning and prior experience. Each student learner brings a unique history to the classroom and therefore each learner is different from all other learners. He or she builds new knowledge using different cognitive tools and different procedures in a different order than any other learner uses. Thus, no one academic program suits all learners, especially in a discipline as broad, as rapidly-changing and as relevant to modern society as biology. Because it has a much more flexible structure and allows for maximum individualization of the program of study, the B.A. in Biology provides educational opportunity for learners who do not "fit" in our focused B.S. programs.

The B.A. in Biology provides strong interdisciplinary training through the requirement for a complementary field and the enhanced opportunity to minor or double major. By taking a significant number of courses outside Biology, students regularly interact with people in other academic departments and programs, mingle with them on a routine basis and even socialize into other disciplines. In this way, B.A. in Biology students receive exposure to different habits of mind and different ways of thinking. They learn that there is more than one approach to a given subject or a problem. In general, the interdisciplinary emphasis of the B.A. in Biology helps students to acquire a skill generally known as "adaptive expertise", which describes the ability to apply knowledge to a new situation in unfamiliar surroundings. Thus, the B.A. provides appropriate preparation for the rapidly-changing job market and the shifting economy that our graduates can expect.

Transfer students and community college students sometimes bring academic records that include an idiosyncratic collection of courses that is difficult to apply to a degree program. For two reasons, the B.A. in Biology often provides these students with a more direct route to the

four-year baccalaureate than the B.S. The B.A. in Biology requires fewer lab courses than the B.S., making it easier for B.A. students to build a class schedule each semester and complete degree requirements on time. Also, community college and transfer students can usually count some of their prior courses toward the complementary field.

Finally, the Bachelor of Arts degree is not a "second-class" or "consolation" degree. In fact at many institutions it is considered to be a superior degree compared to a more applied B.S. Moreover, the Bachelor of Arts degree is not an impediment to pursuit of an advanced degree in the biological sciences. For example, medical and professional schools encourage "well-rounded" applicants and routinely accept B.A. graduates. As a second example, among the 22 tenure-track faculty in the IUP Biology Department who hold a Ph.D. or D.Ed., seven earned a B.A. as their undergraduate degree.

This supporting document was reviewed by all faculty members in the Department of Biology. The departmental response was discussed at two departmental meetings. Comments from faculty members were accepted and incorporated into the document. At the departmental meeting of 2 September 2011, the biology faculty voiced unanimous support for the continuation of the B.A. in Biology.

SUBJECT:

Indiana University of Pennsylvania
Academic Affairs Program Review and Faculty Workforce Plan
Response from Chemistry Department Curriculum Committee

Management Initiated Program Moratorium/Elimination of the CHEM BA

The Chemistry Department currently offers the BS CHEM, BS CHEM PREM, BA CHEM, BA CHEM PREM and the BS CHEM ED degree. The Administration is considering eliminating the BA CHEM which also includes the BA CHEM PMED. The Administration's justification for placing the BA degrees in moratorium is that the BA is "similar to the BS with fewer chemistry courses and a complementary area"; further, "BA students could shift to BS".

Administration has listed the following criteria for moratorium, but has addressed only Resource Sufficiency and Impact on Educational Opportunity for placing the CHEM BA in moratorium:

Appropriateness to Mission
Need
Coordination with Other Programs
Periodic Assessment
Resource Sufficiency
Impact on Educational Opportunity

Response by the Chemistry Department Curriculum Committee to Dean Snavely

Background: The BS CHEM is certified by the American Chemical Society (ACS), and is the degree of choice for those students who know they want the traditional chemistry career path. The extensive laboratory training offered in the BS CHEM makes this degree highly respected in academia and industry. A BA CHEM degree traditionally has few laboratory requirements, and is for those students who are interested in chemistry, but who also have a desire to explore other, possibly less-traditional, career paths that are linked to chemistry. The BA still leaves open the option of a traditional chemistry career if, in the progress of their college career, students come to that decision. The majority of our majors earn the BS, but a significant handful earn the BA - some on purpose, some because they find themselves unable to complete the BS in a timely manner. The BA CHEM is significant because it provides opportunities to students who A) transfer to IUP B) wish to earn a double major C) change majors (including from BS CHEM), and/or D) wish to maintain maximum flexibility because they are uncertain about their intended profession, yet maintain an interest in science and a complementary field. Removing the BA CHEM will limit the ability of students to explore scientific fields - and hence discourage them from choosing a chemistry major, at a time when the United States (and the state of Pennsylvania) has a pressing need for well-trained scientists.

We will examine the two criteria raised by Administration as it applies to the BA CHEM, with the understanding that the same applies to the BA CHEM PMED.

Resource Sufficiency

All necessary resources to offer the degree requirements of the BA CHEM are currently in place and, most importantly, are also utilized by the CHEM BS students. In other words, no additional

resources are required to offer the BA with the BS CHEM. Indeed, a BA CHEM major likely consumes fewer resources because of fewer required laboratory courses. A side-by-side comparison of degree requirements is presented in Table One:

Table One: COMPARISON OF DEGREE REQUIREMENTS OF BS CHEM vs. BA CHEM

A. CHEMISTRY REQUIREMENTS			**BS**	**BA**
CHEM 113	Concepts in Chemistry I	(4 cr)	✓	✓
CHEM 114	Concepts in Chemistry II	(4 cr)	✓	✓
CHEM 214	Intermediate Inorganic	(2 cr)	✓	✓
CHEM 231	Organic Chemistry I	(4 cr)	✓	✓
CHEM 232	Organic Chemistry II	(4 cr)	✓	✓
CHEM 301	Intro. to Chemical Research	(1 cr)	✓	
CHEM 321	Quantitative Analysis	(4 cr)	✓	✓
CHEM 322	Instrumental Analysis	(4 cr)	✓	
CHEM 341	Physical Chemistry I	(4 cr)	✓	✓
CHEM 343	Phys. Chemistry Lab I - W	(1 cr)	✓	✓
CHEM 342	Physical Chemistry II	(3 cr)	✓	
CHEM 344	Phys. Chemistry Lab II	(1 cr)	✓	
CHEM 410	Advanced Inorganic Lab	(1 cr)	✓	
CHEM 411	Advanced Inorganic	(3 cr)	✓	
CHEM 498	Problems in Chemistry - W	(2 cr)	✓	
CHEM ___	_____(elective)	(3 cr)	✓	✓
CHEM Credits			**45**	**30**

Note: CHEM electives for BS are CHEM 331, 335, 421, 441, 481 or any 500-600 level CHEM course. CHEM electives for BA are CHEM 301, 322, 335, 342,351, 410, 411, BIOC 301, 302, 311

B. OTHER SCIENCE REQUIREMENTS			**BS**	**BA**
BIOC 301	Biochemistry I	(3 cr)	✓	
BIOL 111	Principles of Biology I	(4 cr)	✓	
PHYS 131	Physics I	(3 cr)	✓	✓

PHYS 132	Physics II	(3 cr)	✓	✓
PHYS 141	Physics I Lab	(1 cr)	✓	✓
PHYS 142	Physics II Lab	(1 cr)	✓	✓
MATH 125	Calculus I Nat Sci & Math	(3 cr)	✓	✓
MATH 126	Calculus II Nat Sci & Math	(3 cr)	✓	✓
MATH 225	Calculus III Nat Sci & Math	(3 cr)	✓	✓
MATH ___	_____(elective)	(3-4 cr)	✓	_____
Other Science Credits			**23-24**	**17**

Note: BA may take PHYS 111/112/121/122 instead of 131/132/141/142.

Clearly, the BA CHEM requires far fewer science credits than the BS CHEM; the science credits that the BA requires would also already be offered to BS CHEM students . Thus, the BA CHEM does not use additional resources.

According to the Program Prioritization provided by the administration, the key variables are "Quality, Centrality, Viability and Cost". Data have been provided only for the COST variable:

Table Two: Cost of CHEM degrees as provided by Administration

CHEM	3yr cost/FTE	2010 HC	3yr wt ave HC	3 yr wt ave Comple	3 yr ave minors
CHED	$5273	17	16.3	1.8	
BA	$7167	8	6.7	1.3	
BS	$7497	40	39.6	3.7	
PMED BA	~$7000	4	4.3	0	
PMED BS	~$7000	19	16.8	0.2	
					30

A different view of the side-by-side comparison of CHEM course requirements for the degree programs can be made as follows:

Table Three: Side-by-Side CHEM course comparison of all CHEM undergraduate degrees

Course/ Degree	BA	BA PMED	CHED	BS	BS PMED
CHEM 113	X	X	X	X	X
CHEM 114	X	X	X	X	X
CHEM 231	X	X	X	X	X
CHEM 232	X	X	X	X	X
CHEM 214	X	X	X	X	X
CHEM 301				X	X
CHEM 321	X	X	X	X	X
CHEM 322				X	X
CHEM 341	X	X	X	X	X
CHEM 342				X	X
CHEM 343	X	X	X	X	X
CHEM 344				X	X
CHEM 410				X	X
CHEM Elective	X	X	X	X	X
CHEM 498/499			X	X	X
CHEM 351/BIOC 301		X		X	X

From Table Three, it is difficult to understand the cost analysis provided by Table Two. For example, in the second column of Table Two, "3 yr. Cost/FTE", the cost for the BA CHEM and the BA CHEM PMED were listed as $7167 and ~$7000 respectively. The method for determination of Costs/FTE is not stated, but the values are not consistent with the other CHEM degrees if the cost analysis is based on the CHEM courses that are required. From Table Three, the number of CHEM requirements for the BA, BA PMED and CHED are identical, except for one course. Yet the cost of the CHED program is about $2000 lower than BA and BA PMED. It is also not clear why the PMED BA and PMED BS are listed at "~$7000", when others have specific costs.

The requirements for the BA, BA PMED and CHED completely overlap the courses for the BS and BS PMED. Eliminating the BA and BA PMED degrees will not result in any cost savings in CHEM course offerings. In fact, the effect of placing the BAs in moratorium would likely be to reduce the number of students enrolled and the number of degrees awarded (see "Impact on Educational Opportunity" below), potentially making the remaining BS programs LESS viable. Furthermore, since the 2010 headcount in these degree programs are small (8 in BA and 4 in BA PMED), eliminating the BA would not be sufficient to cause a decrease in the number of lab sections for CHEM courses. In other words, removing the CHEM BA would make the CHEM offerings even more expensive, per student.

It is unclear how cost of the BA and BA PMED degrees have been computed as the method of calculation of the 3 yr. Cost/FTE and the other items in the document have not been provided. There is NO indication in the columns used that focus is on anything but cost. It is troubling that "Quality", "Centrality", "Viability" have not merited mention.

Impact on Educational Opportunity

Administration's suggestion that BA students could "shift to BS" is impractical for most BA students. Such a change would add considerable cost to the student, both in tuition and time. Some of the 21 credits required for the BS degree come from upper-level courses that carry sequential pre-requisites, which could add more than a year to a student's graduation time. The BA CHEM is a respected degree in its own right: those students who have entered into the BA CHEM in the last five years have gone on to successful careers, graduate school or medical school. Many of them were students who changed majors or transferred to IUP as sophomores or juniors; the BA CHEM gave them the opportunity to graduate in a timely manner, with their previous major constituting their complementary field. Obtaining a BS would have added a year or more of studies to their time at IUP.

Other Criteria

Although the Administration has not raised issue with the other criteria for placing a program in moratorium, we address those criteria below:

Appropriateness to Mission and Impact on Educational Opportunity

The 2007-2012 University Strategic Plan identifies the university's core strengths and values to be:

- Access with opportunity to succeed
- Engaged Learning
- Student-Centered Emphasis

The overarching strategic goals, outlined by the plan, include:

- Student Development and Success: To facilitate the achievement of academic and personal goals by existing programs and services, and creating new ones, in order to ensure the growth and development of the whole person.

As stated earlier, the BA CHEM provides opportunities to students who transfer to IUP, who wish to earn a double major, who change majors (including from BS CHEM), or who wish to maintain maximum flexibility because they are uncertain about their intended profession, yet maintain an interest in science and a complementary field.

Consider the CHEM BA graduates 2005-2011:

2005 – None

2006 – Lahnor Ridley (BA PMED): Started as BS CHEM PMED; had transfer credits from Temple and Community College; Went to MEDICAL SCHOOL

2007 – None

2008 – John P. Crandall (BA CHEM): entered as undeclared Natural Science major, switched to CHEM in his junior year, graduated as a double major BA CHEM and BA PSYC with MATH minor, joined U.S. Navy

Jane Calvert: entered as BA CHEM, graduated Summa Cum Laude, minors in ENGLISH and WOMENS STUDIES

2009 - Christina Arnold: changed in her junior year from a BA CRIM to BA CHEM (with a CRIM minor); she went to Arcadia University for an MS in Forensic Science

Lacie K. Buxton: entered IUP as a CRIM major, changed as a sophomore to BA CHEM ED. She planned to go to Penn State University for an MS in Special Education

Lena E. Zein: entered IUP as BA CHEM, earned a MATH minor, and went to the MS Chemistry program at George Mason University

2010 - Sarah Dahlheimer: transferred to IUP after two years at the University of Maryland, double major BA CHEM and BA PSYC, graduated Summa Cum Laude

2011 - Clinton Matthew Wilson: entered IUP in General Studies, became a BA CHEM major in his sophomore year; also earned a PHYS minor

The BA CHEM is designed to provide students with a flexible, interdisciplinary degree program. Various combinations of chemistry and other academic fields allow students to take advantage of synergies between disciplines, and may better fit the individual student's strengths and interests. Here are some examples of suggested curricula for the complementary field of the Chemistry B.A. degree:

Art – for students who are interested in applying chemistry to the studio arts or restoration

ART 113	3-D Design	3

two courses from the following:

ART 214	Ceramics	3
ART 215	Sculpture	3
ART 216	Jewelry & Metal	3
ART 217	Print Media	3
ART 219	Fibers	3

two courses from the following:

ART 316	Intermediate Jewelry & Metal	3
ART 452	Advanced Ceramics	3
ART 453	Advanced Sculpture	3
ART 457	Advanced Print Media	3
ART 459	Advanced Fibers	3
ART 460	Advanced Jewelry & Metal	3

Business & Economics – the chemical and pharmaceutical industries provide opportunities at both the entrepreneurial and managerial levels, so students interested in these careers paths would benefit from a foundation in business and economics.

ECON 121	Principles of Macroeconomics	3

ECON 122	Principles of Microeconomics	3
ACCT 200	Foundations of Accounting	3
MGMT 310	Principles of Management	3

one of the following:

MGMT 325	Small Business Management	3
MGMT 330	Production and Operations Management	3

Forensic Science - students interested in forensic science should take courses recommended by the Forensic Science Education Accreditation Commission of the American Academy of Forensic Science as a prelude to graduate study in forensic science.

CHEM 105	The Forensic Chemistry of CSI	3
BIOL 111	Principles of Biology 1	4
MATH 216	Probability and Statistics	3
CHEM 205*	Forensic Evidence Analysis (*new course)	4 (with lab)
CHEM 322	Analytical Chemistry II	3 (counts as CHEM elective)

Or

CHEM 331	Organic Molecular Structure Determination	4 (counts as CHEM elective)

Students can also take these courses as part of their Liberal Studies Requirements or free electives:

CRIM 101	Crime and Justice Systems	3
ENGL 312	Public Speaking	3
GEOS 153	Forensic Geology	3
PSYC 388	Forensic Psychology	3

Geoscience – for students interested in the interface between chemistry and geology.

GEOS 201	Foundations of Geoscience	4
GEOS 202	Quantitative Methods in the Geosciences	2
GEOS 301	Mineralogy and Petrology	4
GEOS 311	Geochemistry	4
CHEM 342	Physical Chemistry II	3 (counts as CHEM elective)
CHEM 411	Advanced Inorganic Chemistry	3

Physics & Materials Science – the area of materials, which is in the interface between chemistry, physics and engineering, is an important and growing sub-division of science. Students choosing this complimentary field are strongly encouraged to take PHYS 131, 132, 141 and 142 in place of PHYS 111, 112, 121, and 122.

MATH 241	Differential Equations	3

CHEM 343	Physical Chemistry II	3 (counts as CHEM elective)
PHYS 322	Electricity and Magnetism I	2
PHYS 490	Solid State Physics	3

one of the following:

CHEM 411	Advanced Inorganic Chemistry	3
PHYS 331	Modern Physics	3
PHYS 461	Quantum Mechanics I	3
PHYS 475	Physics of Semiconductor Devices	3

Philosophy – for students interested in the philosophy of science, or for students intending a career in law.

PHIL 101	Methods of Critical Thinking	3
PHIL 222	Ethics	3
PHIL 325	Modern Philosophy	3
PHIL 330	Philosophy of Science	3
PHIL 421	Theory of Knowledge	3

Political Science – students interested in public policy concerning chemistry and science need a foundation in political science as well as strong knowledge in chemistry.

PLSC 101	World Politics	3
PLSC 111	American Politics	3
PLSC 250	Public Policy	3
PLSC 370	Introduction to Public Administration	3
PLSC 376	Public Sector Budgeting and Fin. Manag.	3

Math & Computer Science – computational and theoretical methods are an important and growing area of chemistry. Students interested in this field need strong skills in math and computer science, as well as knowledge of chemistry. Students in this field are strongly encouraged to take Physical Chemistry II (CHEM 342) as their chemistry elective.

COSC 110	Problem Solving and Struc. Programming	3
COSC 250	Introduction to Numerical Methods	3
MATH 241	Differential Equations	3
MATH 342	Advanced Math for Applications	4

one of the following:

COSC 420	Modern Programming Languages	3
COSC 450	Applied Numerical Methods	3

In addition, some students may be interested in designing a customized BA chemistry degree program. Many combinations of the basic BA CHEM curriculum with complementary courses are possible, but these must be approved by the student's advisor and the department chair. A combination of chemistry and English, or a foreign language, for example, could provide the basis for a career in technical writing.

Need

The following table summarizes applications to the CHEM degree programs.

Table Four: Number of Applicants to CHEM degree programs

PROG	2008-09	2009-10	2010-11	3 yr wt ave
CHED	10	18	15	14.9
CHEM BA	20	9	14	13.7
CHEM BS	39	44	57	49.5
CHEM PM BA	16	10	8	10.2
CHEM PM BS	20	41	24	28.3

There has been a marked decline in CHEM BA applications, which is likely due to lack of marketing by the department as we have focused on re-certification of the CHEM BS degree to meet the new requirements of the American Chemical Society (ACS). (See comments below to further address this problem).

The CHEM BA is a flexible, applied degree program that could serve a wide range of student interests, and has a significant opportunity for growth.

Periodic Assessment

In our previous program review, the chemistry department did not focus on the BA CHEM. Emphasis has been placed on our ACS-certified BS degree program, in part due to the nationally recognized credential carried by the degree (and the fact that we must provide annual reports to the American Chemical Society to ensure that we meet the changing criteria set forth by the Committee on Professional training. We are currently effecting curricular change to meet new certification requirements). Our degrees awarded reflect this focus.

Table Five: Number of CHEM degrees awarded

PROG	2008-09	2009-10	2010-11	3 yr wt ave
CHED	5	1	1	1.8
CHEM BA	2	3	0	1.3
CHEM BS	2	6	3	3.7
CHEM PM BA	0	0	0	0.0
CHEM PM BS	1	0	0	0.2

However, as we are undergoing another cycle of program review, we have set curricular enhancement as a main goal, including examination of the BA CHEM and (BA CHEM PREMED). Previously, it has largely been a 'fallback' for the students who for some reason cannot/do not meet the BS degree

requirements and wish to graduate in a timely manner. Indeed, the current catalog description lacks any solid suggestions for coursework in complementary fields. Our curriculum committee is already working to rectify this point, and to provide more focus and more suggestions for incoming students. Furthermore, with a new departmental emphasis on an Applied PSM, the better-marketed CHEM BA would complement the change in the CHEM MS program.

Coordination with other programs

Along with the obvious multidisciplinary connections to complementary fields that have been described above, the CHEM BA can meet the needs of chemistry students interested in multidisciplinary fields such as Environmental Science (Green Chemistry), Patent Law, Technology Management, Forensics, and Chemical Informatics. The CHEM BA has the potential to forge stronger partnerships with other departments, and with businesses, with the possibilities for internships in business or industrial settings. An applied BA CHEM is also a natural segue to the CHEM PSM.

Summary of Justification for Maintaining/Enhancing the CHEM BA

- The CHEM BA does not cost additional resources above a CHEM BS; indeed the BA appears to require fewer lab resources than the BS. Furthermore, the BA students help fill the upper level CHEM courses, making more effective use of faculty resources.

- The CHEM BA increases flexibility and access to educational opportunities at the undergraduate and (potentially) graduate level. It properly prepares students for careers, graduate school and medical school, and allows them to graduate in a timely manner.

- The CHEM BA has the potential to provide a multidisciplinary approach to chemistry in a vast array of complementary fields.

- The CHEM BA has the potential to expand with significant growth, given the opportunity for marketing/promotion.

- The CHEM BA is being carefully reviewed as part of our current department program review.

- Under the auspices of strategic planning, we are trying to develop a CHEM-PSM program that would clearly serve the CHEM BA graduate. BA CHEM majors are an obvious source of potential customers. The coordination between programs should be fostered rather than eliminated.

Analysis of undergraduate student credit hours offered by the CHEM dept show that only 6% of our course offerings are provided to department majors. The Chemistry Department clearly serves the university. Our CHEM BA program has no additional cost impact on the university, provides flexibility to our students, enhances the diversity of students in the BS CHEM courses, and has a high potential for growth. The Chemistry Department maintains that it is inappropriate and short-sighted for this program to be placed in moratorium.

This document was written and approved by the Chemistry Department Curriculum Committee, reviewed by all regular faculty members, and approved by a majority of the Department.

WFD Response from Dr. George Long, Chemistry Department Chair

Why the Chemistry BA degree program should not be placed in Moratorium.

1. Current issues – The BA in Chemistry program suffers from low enrollments, with an average FTE of 7.6, and about 1 graduate per year. Initial enrollments in the BA program are 3-5 (this year there are 5 freshman enrolled as BA majors). Usually this decreases significantly in subsequent years, as many students that enter as CHEM-BA majors switch to CHEM-BS majors early on, since the CHEM–BS major allows the students degree to be certified by the American Chemical Society. The few graduates we have in the BA program fit into two categories, the first group are students who want to go into related professions, for instance we have had alumni in patent law, and in forensic science. The second group are students that either transferred, or had some academic trouble and opted for the BA degree to be able to graduate in a timely fashion. Our problem is that the BA has come to have a reputation based on the second group of students, rather than the first, and has become less attractive to students.

2. Cost of the program. The CHEM-BA program **does not require any additional chemistry faculty**, so there will be no faculty to reassign if the program is deleted. The CHEM-BA major requires *fewer* chemistry courses than the CHEM-BS, instead students are required to obtain 15 credits from courses in a complimentary field, generally courses outside the Chemistry Department. Consequently, CHEM-BA majors have a bit lower cost per FTE than CHEM-BS majors. All of the chemistry courses required by the CHEM-BA are also required by the CHEM-BS, so in fact, several required chemistry courses may be under enrolled without the 2 or 3 CHEM-BA Majors that take the course. Thus, the existence of the CHEM-BA helps to reduce the cost/fte of the CHEM-BS program.

3. Coherence with Strategic plan. The BA program supports strategic goal 1c. "Increase flexibility and access to educational opportunities at the undergraduate and graduate level." Specifically, the program provides an opportunity for chemistry students to take more elective courses outside their discipline. Further, availability of the BA program will help the department forge stronger partnerships with businesses, since the BA program would have students with more diverse interests, that would be well served by internships in a business or industrial setting.

4. Future potential. The CHEM-BA offers the greatest potential for increasing the enrollment in the chemistry department, and thus reducing the high costs of many of the 200/300 level Chemistry majors courses. While the BS program is the core of the department offerings, the requirements of training a professional chemist are such that little flexibility remains in the curriculum given the 120 credit limit. The BA program will meet the needs of chemistry students interested in more interdisciplinary fields, for instance Environmental Science or Green Chemistry, Patent Law, Technology Management, and Chemical Informatics, to name a few. Serving the growing number of students interested in these interdisciplinary fields represents a significant opportunity for department growth.

5. Recruiting It is fair to say that faculty in the chemistry department have not focused on the CHEM-BA program, choosing instead to promote the research oriented CHEM-BS, the

Biochemistry program and the now defunct SDR program. Our record of success with CHEM-BS students is significant, as many of our students continue their study of chemistry at top-tier graduate schools. However, there is a limited and essentially constant number of students interested in this type of program, and while targeted recruiting may increase the numbers of CHEM-BS majors, the possible growth is fairly limited.

The CHEM-BA, on the other hand, is a more flexible, applied degree program that could serve a wider range of student interests, and in my view has a more significant opportunity for growth . The degree could be marketed to specific interest groups, for example, students interested in science and technology management, environmental science, or even forensic science might choose a CHEM-BA degree. A greater focus on the "applied"CHEM-BA degree would complement the change in the CHEM-MS program to a CHEM – PSM program, since the CHEM-PSM degree is ideal graduate program for someone with a CHEM-BA.

6. Summary. The Chem-BA program offers significant potential for growth in the Chemistry Department, while at the same time requiring no additional faculty. Given the need for the Chemistry department to increase enrollments, it would be detrimental, in my view, to close off one of the better avenues for achieving growth by putting the CHEM-BA program in moratorium. If necessary, the department could set reasonable enrollment goals, based on our program review data, and re-evaluate the program relative to these goals in several years.

WFD Response from Chemistry Department Graduate Committee

Dr. Snavely,

Anne Kondo indicated you wanted to receive some information about the prior moratorium issue of the Chemistry MS/MA program. Below is some chronology to the best of my recollection, though our previous Chair, John Woolcock may be helpful in correcting inaccuracies in dates, letters, etc. I can provide documents to support the information below, if needed.

In the spring of 2009, the Department of Chemistry has received notice, via our current Interim Dean, Mary Lou Zanich, that PASSHE had identified the Chemistry Department's MS/MA program as being a "low-enrolled" program. Dr. Moran of PASSHE had asked the Dean to have the Department propose a strategy for improvement/modification of the program. In fall 2009, Dr. Woolcock (Chair at that time) submitted a response to Dr. Mary Lou Zanich suggesting retention of the existing program and offering suggested actions toward improving recruitment and graduation rates. The response was largely written by the Graduate Committee in consultation with Department Chair. PASSHE rejected this plan, and suggested that the Department consider modifying the MS/MA program to a PSM program.

In late fall 2009, the Graduate Committee drafted a lengthy proposal for creating a PSM degree in Applied and Industrial Chemistry that would replace the existing MS/MA program. In early spring 2010, The Graduate Committee presented this proposal at a Chemistry faculty meeting for discussion. The Graduate Committee also motioned for a faculty vote whether to proceed with a plan to change the MS/MA program to the PSM program. The faculty approved this change. A response was submitted by the Department Chair to the Dean (Zanich) indicating the faculty had approved the strategy to develop a PSM program. This information was included in another response by Dean Zanich to PASSHE indicating that the Chemistry Department's new strategy was to develop a PSM program. PASSHE accepted this plan. It is my recollection that PASSHE's response saying this plan was acceptable also indicated that the that the MS/MA program would be placed in moratorium. I am not aware, however, that there has been any official notice to our Department that the MS/MA program is formally in moratorium. Discussions I've had with Dean Zanich and Dean Mack indicate this is their understanding. Thus, the Graduate Committee proceeded with this plan to develop a PSM program.

In the spring of 2011, the Graduate Committee drafted an initial outline of presenting the PSM program to the University Graduate Committee. In April 2011, this plan, though not in final form, was presented to the Chemistry faculty at a faculty meeting for review. The Graduate Committee motioned for a vote to accept the curriculum for the PSM program. The Graduate Committee asked for a vote on only the curriculum of the PSM program, not a vote on the overall document. The faculty approved the curriculum.

The Graduate Committee, with assistance from the Graduate School is now finalizing the PSM outline so that it can be presented to the Chemistry faculty for final approval. Once, and if, approved by the Chemistry faculty, the proposal will be sent to the University Curriculum Committee for approval.

I hope that helps bring you up to date on the status of our MS/MA & PSM programs.

M.Ed. in Elementary and Middle School Mathematics

From: Elementary Mathematics Education Committee (EMEC) of the Mathematics Department

The current workforce plan calls for the placement in moratorium for the M.Ed. in Elementary and Middle School Mathematics, and the re-assignment of the faculty to other teaching responsibilities.

The suggested re-assignment is simply **NOT POSSIBLE** as every course taught in either the fall or spring semesters for the M.Ed. was a dual level course taught for the Elementary Education Math Concentrate (in the past) and is now offered for the Middle School Certification program, a program that is NOT scheduled to be placed in moratorium. In the program, courses that are for graduate students only (where undergraduates are not enrolled) are only offered in the summer, provided a sufficient number of students enroll in the course. The elimination or placing in moratorium of the program has however the **potential for revenue loss ranging from $61,000.00 to over $100,000.00 per fiscal year** as indicated in the table included below. The table lists actual enrollment (separated by undergraduate and graduate) for all the courses offered in springs and fall for the program since fall 2008. Revenue loss was determined by computing the tuition, fees and state appropriation lost per graduate student taking each course. For the purpose of an estimate, tuition, fees, and state allocation for fall 08 to spring 11 were taken from the figures for the most recent academic year, while figures for fall 11 are based on current tuition and fees.

Semester	Year	Class	Underg. Enrollm.	Grad. Enrollm.	Additional Graduate Tuition	Additional Fees	State Allocation	Revenue Loss
Fall	2011	MATH 420	23	0				
Fall	2011	ELMA 520	0	7	$8,736.00	$2,555.00	$7,904.17	$19,195.17
Fall	2011	MATH 456	28	0				
Fall	2011	ELMA 556	0	3	$3,744.00	$1,095.00	$3,387.50	$8,226.50
Fall	**2011**	**Total**						**$27,421.67**
Spring	2011	MATH 458	13	0				
		ELMA 558	0	5	$5,805.00	$1,415.00	$5,645.83	$12,865.83
		MATH 459	15	0				
		ELMA 559	0	6	$6,966.00	$1,698.00	$6,775.00	$15,439.00
		MATH 317	21	0				
		ELMA 517	0	6	$6,966.00	$1,698.00	$6,775.00	$15,439.00
Spring	**2011**	**Total**						**$43,743.83**
Fall	2010	MATH 456	24	0				
Fall	2010	ELMA 556	0	4	$4,644.00	$1,132.00	$4,516.67	$10,292.67
Fall	2010	MATH 461	6	0				
Fall	2010	ELMA 581	0	5	$5,805.00	$1,415.00	$5,645.83	$12,865.83
Fall	2010	MATH 471	16	0				
Fall	2010	ELMA 571	0	5	$5,805.00	$1,415.00	$5,645.83	$12,865.83
Fall	**2010**	**Total**						**$36,024.33**

Spring	2010	MATH 457	14	0				
Spring	2010	ELMA 557	0	6	$6,966.00	$1,698.00	$6,775.00	$15,439.00
Spring	2010	MATH 459	9	0				
Spring	2010	ELMA 559	0	1	$1,161.00	$283.00	$1,129.17	$2,573.17
Spring	2010	MATH 471	19	0				
Spring	2010	ELMA 571	0	4	$4,644.00	$1,132.00	$4,516.67	$10,292.67
Spring	**2010**	**Total**						**$28,304.83**
Fall	2009	MATH 420	13	0				
Fall	2009	ELMA 520	0	5	$5,805.00	$1,415.00	$5,645.83	$12,865.83
Fall	2009	MATH 456	6	0				
Fall	2009	ELMA 556	0	3	$3,483.00	$849.00	$3,387.50	$7,719.50
Fall	2009	MATH 458	11	0				
Fall	2009	ELMA 558	0	5	$5,805.00	$1,415.00	$5,645.83	$12,865.83
Fall	**2009**	**Total**						**$33,451.17**
Spring	2009	MATH317	9	0				
Spring	2009	ELMA 517	0	5	$5,805.00	$1,415.00	$5,645.83	$12,865.83
Spring	2009	MATH 471	16	0				
Spring	2009	ELMA 571	0	10	$11,610.00	$2,830.00	$11,291.67	$25,731.67
Spring	2009	MATH 481	10	0				
Spring	2009	ELMA 581	0	6	$6,966.00	$1,698.00	$6,775.00	$15,439.00
Spring	**2009**	**Total**						**$54,036.50**
Fall	2008	MATH 420	13	0				
Fall	2008	ELMA 520	0	4	$4,644.00	$1,132.00	$4,516.67	$10,292.67
Fall	2008	MATH456	14	0				
Fall	2008	ELMA 556	0	6	$6,966.00	$1,698.00	$6,775.00	$15,439.00
Fall	2008	MATH 457	15	0				
Fall	2008	ELMA 557	0	11	$12,771.00	$3,113.00	$12,420.83	$28,304.83
Fall	**2008**	**Total**						**$54,036.50**

The rationale given in Dean Snavely's "Workforce Plan and Program Moratorium/Elimination" memo for proposing putting the M. Ed in Elementary and Middle School Mathematics Education in moratorium was "Teacher certification changes impact this major". Further clarification from Dean Snavely indicated that "According to the Dean of COEET, such discipline-specific majors are inconsistent with new requirements for continuing certification and with discussion about the removal of incentives for MA degrees" (see the end of this document for Dean Snavely's memo).

This statement from the Dean of COEET consists of two arguments.

1) "Discipline-specific majors are inconsistent with new requirements for continuing certification"

This seems to be referring to the new PDE requirements that Level 2 teacher certification must include 6 credits in the area of Inclusive Classrooms and / or in the area of Standards Aligned Systems (SAS). Our current program contains 6 credits that we believe will fulfill these requirements (ELMA 652 and ELMA 650 respectively). This impacts all M. Ed. programs and is not related just to "discipline-specific" programs. We are not aware that any other program has fully implemented these changes. In fact, there is a national movement towards preparing content-specific building and district coordinators in mathematics.

2) "Discussion about the removal of incentives for MA degrees"

The basis for this statement is not clear, but may be referring to proposals by some "education reformers" to replace salary increases for K-12 teachers that are based on graduate credit, by increases based on student test scores. This proposal has not gone far in US education. If it were to be implemented, it would affect all graduate recruitment of teachers, not just "MA degrees". Of course, this program is not an MA degree.

In fact, the Indiana Area School District, in its most recent contract, added a new step for Master's degree plus 45 credits, further rewarding teachers who take graduate courses. School district policies that reimburse tuition to teachers for taking graduate courses are unchanged throughout the county.

Recruitment

The co-coordinators of the M.Ed. in Elementary and Middle School Mathematics Education program worked with the graduate school during the 2010-2011 school year on the issue of recruiting students to the program.

A post-card mailing advertising the program was sent to over 1000 elementary and middle school teachers in western Pennsylvania. In addition, a brochure was developed and printed that describes the program. The brochure will be taken to professional conferences in Atlantic City and at Penn State this fall and to a national conference in Philadelphia in April.

Finally, one of the co-coordinators will be attending the graduate recruitment workshop on Friday, September 23, to further develop strategies for recruiting more students to the program. As a result of this workshop the following recruitment measures will be undertaken:

- Recruit seniors in the undergrad. elem./ms program, particularly any that are in the Honors College.
- Since half of our inquiries about the program come via the IUP website, we need to update our website with a focus on what the program can do for the student; include a multimedia presentation showing students engaged in ELMA classes, use of technology, etc.
- Contact other local universities, such as UPJ, that do not have the M.Ed. program and ask them to provide info to their students or have us do presentation to their students about our program
- Make direct contact with local schools and advertise our program to teachers who do not have a masters
- Ask our current students in the program to contact prospective students
- Survey our current and past students about the program – what was most beneficial, etc.; what needs to be improved

- Once a student has applied to the program, keep in regular contact with them through the admission process until they have enrolled in classes

==========

EMEC therefore believes that the M.Ed. in Elementary and Middle School Mathematics Education should not be placed in moratorium status.

The preceding response was approved by the Elementary Mathematics Education Committee (EMEC) of the Mathematics Department on September 22, 2011. One of EMEC's specific areas of responsibility within the Mathematics Department is the M.Ed. in Elementary and Middle School Mathematics Education.

Dean Snavely's memo of Sept. 7, 2011

==========

From: "Deanne Snavely" <snavely@iup.edu>
Subject: Re: Workforce question
Date: September 7, 2011 4:09:11 PM EDT
To: "Larry Feldman" <Larry.Feldman@iup.edu>
Cc: Francisco Alarcón <falarcon@iup.edu>, "Aleksandra Kaniasty" <Aleksandra.Kaniasty@iup.edu>

Hello,
In writing memo I referred to information that Dr. Zanich had left for me to use. I paraphrased from her notes.

Dr. Zanich had written for the MAED MED "According to the Dean of COEET, such discipline-specific majors are inconsistent with new requirements for continuing certification and with discussion about the removal of incentives for MA degrees." I shortened this to "Teacher certification changes impact this major."

If this statement is not true or only partially true, I hope that you would include this in your response to the moratorium/elimination of the program.

Thanks for asking and I look forward to the response from the curriculum committee.
Thanks, Deanne

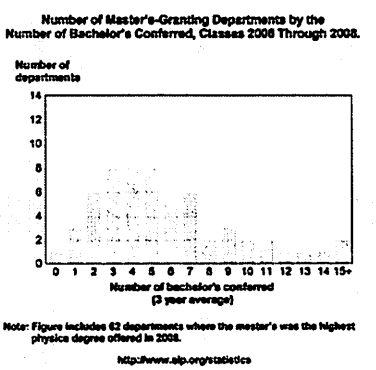
Physics Department Curriculum committee
Comment on proposed program deletions and moratorium

General principles that apply to all IUP physics programs

Before discussing specific programs, the committee would like to look at issues about Physics programs in general. Recommendations have been made about enrollment patters in isolation, without reference to other institutions. The Departmental Curriculum Committee feels that the Physics Department should be compared with other similar departments, and not to disciplines within the University.

Physics Enrollments

The issue of low enrollments in Physics at IUP has been a recent concern. As long as this conversation has been going on, the Physics Department has always maintained that it is not a low enrolled major. The table on the right is from the American Institute of Physics (AIP) and shows the number of Bachelor Degrees conferred by Masters-Granting departments nationwide. According to the IUP Work force plan data, there were 6.2 Physics degrees conferred per year during a similar time period. This put the IUP Physics Department above the mode in this chart.



Master's-Granting* Departments Averaging 5 or More Physics Master's Degrees per Year, Classes of 2006, 2007 & 2008 Combined.

	Annual Average
San Diego State U (CA)	10
Ball State U (IN)	9
U of Louisville (KY)	8
U of Mass, Dartmouth	8
Cleveland State U (OH)	7
Fisk U (TN)	7
Miami U (OH)	7
U of Mass, Boston	7
Christopher Newport U (VA)	6
San Jose State U (CA)	6
U of Puerto Rico, Mayaguez	6
Appalachian State U (NC)	5
CA State U, Long Beach	5
CA State U, Northridge	5
City College (NY)	5
Missouri State U	5
Northern Arizona U	5

List includes only those departments who contributed degree data for all 3 years

* Departments offering a master's as their highest physics degree.

http://www.aip.org/statistics

The M.S. in Physics also has been targeted as low enrollment. The table on the left shows Masters-granting departments that grant 5 or more Physics Masters per year. IUP graduated four masters students over the three years. One more physics graduate student and IUP Physics would be on this chart. It seems to us that in regards to enrollment numbers, IUP Physics is at least average, if not above average.

However, since the issue of efficient use of resources had to be addressed, the Physics Department did implement a course rotation plan, offering major's courses less often, most every other year. This has resulted in an increase in class size, up to 20 in some cases.

Work Force Development –Full Employment

In the area of Work force development, the physics program performs quite well. By the very title of this effort, one would expect that a program where a vast majority of graduates become

gainfully employed after graduation would be lauded. In the last five years the Physics Department has graduated 35 BS Physics and 20 AS/AAS-EOPT students with almost 100 % placement. These students are proficient in the scientific principles such as mechanics, electricity & magnetism, modern physics, optics, fiber-optics, lasers, and also in the processes and operating electronic/electro-optics equipment. They can be employed in high-tech industries including manufacturing, defense, homeland security, operating medical equipment, telecommunications, environmental monitoring, lighting, displays and entertainment. The number of graduates in these is low – it is certainly in line with any other comparable sized schools in the state or in the nation. From the track record of the success of our graduates, we would to conclude that the IUP Physics Department contributes significantly to the work force base of Pennsylvania.

Year/Program	Immediately After Graduation
2009	
Appl Phys/EOPT	Technician at Penn State Electro-optics
Phys (Honors)	PhD Penn State University
Phys (Honors)	PhD Ohio State University
Phys	MS at IUP
Phys-ED	HS Physics Teacher, Kittanning
2008	
Appl Phys/EOPT	Technician at CMU
Phys (Honors)	PhD at University of South Carolina
Phys	PhD at Idaho State University
Phys-ED	HS Physics Teacher, Harrisburg
Phys-ED	PhD University of Idaho
Phys-ED	HS Physics Teacher, Brentwood
2007	
Appl Phys/EOPT	
Phys (Honors)	PhD Michigan State
Phys	
Phys (Honors)	PhD Michigan State
Phys-ED	HS Physics Teacher, Mt. Lebanon
Phys-ED	HS Physics Teacher, Shanksville
2006	
Phys/BA	Graduate Program in Agriculture
Phys (Honors)	Scientist in Government Lab
Phys-ED	HS Teacher in Baltimore
2005	
Phys	Scientist in Alcoa
Phys-ED	HS Teacher in Pittsburgh
Phys-ED	HS Teacher in East Alleghany
Phys-ED	HS Teacher in Baltimore
2004	
Phys	MS at IUP
Phys	PhD at Georgia Tech University
Phys (Honors)	PhD at Louisiana State University
Phys-ED	HS Teacher at Latrobe (Sub)
Phys-ED	HS Teacher in Central, PA
Phys-ED	HS Teacher in Rockwille, MD
Phys-ED	Position in Government Lab

Programs set for Deletion or Moratorium

From the stated facts about IUP, it seems quite clear that the university would not boast if it offered just a few programs. One must realize that different programs (e.g., B.A. and B.S. in Applied Physics) offered by the IUP Physics Department should not be perceived as a disadvantage to the department – these programs require no additional faculty and cost nothing to the university. Students in these programs take a distribution of courses already offered by the Physics Department as well as other departments. While some of these programs are low enrolled, their existence in the undergraduate catalog provides more choices of selections to some students. However, since the wish of the PaSSHE system not to have extensive choices of programs for students, the IUP Physics Department is willing to remove the B.A. in Physics program, and merge the Applied Physics Program into the BS Physics program under one CIP classification. This change has been initiated and is in the curriculum process.

While the removal of the BA was done willingly by the Physics Department, it was done so with regret. It is a different case with the merging of the Applied Physics Program into B.S. Physics.

In this new configuration, three degrees were merged into one. The Applied Physics Degree, Applied Physics/Electro Optics Track, and Applied Physics/Nanotechnology Manufacturing Track were all subsumed into the B.S. Physics Degree. The course work remains the same, only the name of the degree has changed. The department is satisfied with this modification – it streamlines the degree options, and improves student tracking. An even better change was the creation of the new pre-engineering track in the B.S. Program. In the past students who opted for the pre engineering program were housed in the natural science department. When the university started to examine low enrolled programs, it came to the attention of the Physics Department that pre engineering students take physics courses, are advised by physics faculty and deal primarily with the Physics Department. The pre-engineering students at other PaSSHE schools are counted as physics students, so it was decided that IUP should do the same. There are approximately 20 pre engineering students entering the university every fall, but not counted as physics students. The new B.S. Physics / Pre-engineering track will allow the Physics Department to

count these students as their own. With proper tracking of the students when they go to the engineering school and then graduate, the students will count as IUP graduates. The Physics Department is more than delighted with this change.

Graduate Programs

As it has been stated earlier in this document, the M.S. Physics degree enrolls typical numbers for a program at this size and type of institution. In the most recent three years, the number of M.S. students HAS slowly increased to a relative maximum of 10 students. Graduate faculty efforts in the areas of research and grant acquisition has resulted in an exceptional program. The presence of the M.S. program benefits the department faculty, the undergraduate students, and the graduate students themselves. 1) Conducting research is a key component of the Teacher-Scholar faculty model promulgated by IUP. It keeps faculty current in their field, provides a vehicle for outreach in the greater academic community, and gives the university prestige. The existence of the graduate program enhances the depth and breadth of research. 2) Many of the Physics Department upper level courses are dual level, taken by both upper division undergraduates and graduate students. For the undergraduate student enrolled in the department courses, graduate students set an academic standard higher than students would experience in a non-graduate degree granting department. 3) Lastly the graduate students themselves have the opportunity to grow and develop their academic performance. The Physics Department's M.S. program has been the gateway for many Ph.D. physicists. Students who might need a little more time in developing academic skills have used the IUP M.S. in Physics program to transition from the undergraduate degree to the Ph.D.

Recruitment efforts

The department has agreed to develop a PSM degree and we'll continue to do so. However the department feels that the M.S. degree as a viable program and it has an important place in academia. At this point, the M.S. will continue on as a transition graduate program until the PSM is viable.
Who are our customers? We interview all of our incoming students to determine what they want to do, so we can best fit their needs. With very few exceptions over the last five years all of our student's express a desire to go on to do a PhD. The vast majority of them reach that goal. In this field the bachelor degree is an introductory degree. Most students leave the bachelor degree with a taste for the field but they have not reached a level where they can actually do physics or have any depth of knowledge. They are well aware of their level. At this stage the PhD looks extremely daunting and many think they'll try an MS first. Our plan has been to go out and aggressively tap this customer base.

Dr. Devki Talwar already has plans to visit (within the next few months) all of PASSHE schools as well as Pitt, Penn State and Duqesne, to do three things:

> Introduce potential MS physics students to the program we have at IUP and its success rate for students attempting to get into PhD programs.

Offer to pay for the student's application fee. Application fee costs are expensive especially now that students generally need to apply to at least 10 schools. We need to get them to apply and a free application seems to us to be the very best way. While they are applying to other schools they might as well apply to IUP, its free. We expect that there will be a good number that may not get into any of the other schools at this point IUP should look very good as a low-cost, in-state alternative.

Talk to students and begin to bring them in. Free IUP thumb-drives might be a good marketing tool for this demographic (2Meg about $6).

This was our business plan. We are hoping to get out numbers up to 7-8 new students entering the MS program each year. We wish to request the University put the MS programs phase out on hold until at least December 2012 where we will have had two opportunities to recruit in this manner. We also ask that we be given 3 assistantships (comparable to other MS programs) for 2011 and 2012 for this endeavor

Response to the College Dean about Undergraduate Programs in Moratorium Prepared by the Physics Department

Devki N. Talwar

We are requesting to the IUP Administration please do not eliminate undergraduate ***A)*** **APPY NMT** and graduate ***B)*** **PHYS MS** (thesis based) programs

A) ***APPY NMT:*** Elimination of this program in the emerging field of Nanotechnology will have a serious impact on the education of CNSM students as well as on the newly created 3-2 Pre Eng. track in the BS PHYS and on the Physics PSM program *"Nanoscience for Industrial Materials"* that we are currently developing.

Appropriateness to IUP mission (2010-14): For creating and maintaining high quality, well supported, distinctive, and dynamic programs. Clearly, the ***A) APPY NMT*** and ***B) PHYS MS*** (thesis based) programs fall in the University's academic mission.

With the Physics faculty expertise in semiconductor materials and devices and in Nano-scale technology the ***A) APPY NMT*** and ***B) PHYS MS*** programs are distinctive and dynamic serving students and the citizens of Pennsylvania with high quality education and training.

The National Need: President Obama in his address on June 24, 2011 at CMU emphasized the need of educating and providing opportunities to our students in the emerging technology areas including Nanotechnology and creating jobs for them in the high-tech manufacturing sector.

Coordination with other programs: Nanotechnology provides students the ability to work and explore the properties of materials at the atomic levels, understand and create novel structures and devices with new properties and functionalities. The ***A) APPY NMT*** and ***B) PHYS MS*** programs have the potentials to provide tremendous opportunities for students to work in interdisciplinary areas of physics, chemistry, biology and engineering.

Impact on educational opportunity: The ***APPY NMT*** is a collaborative and partnership program providing high-tech educational opportunities to IUP students and creating a high-tech workforce in the exciting and emerging field of nanotechnology – the program is steadily growing. The ***PHYS MS*** (thesis based) program has been graduating 3-4 students each year and sending them to PhD granting top schools in the country.

Why we want to keep the APPY NMT program?

- ✓ In 2000 the National Science Foundation (NSF) realized the growing need of Nanotechnology and provided ~ $100 million to set up five *"National Nanofabrication User Networks"* (NNUN) in the country. One such NNUN was set up at the Penn State University – Research Park.
- ✓ By 2005, over 50 million dollars were spent in creating state-of-the art Nanoscience Laboratories, in the Cleanroom environment, at the Penn State Nanofabrication Research Park site. The creation of such educational facilities was meant for sharing the

Pennsylvania high-tech resources by STEM students at the undergraduate institutions across the Commonwealth – including the students from IUP.

- ✓ The APPY NMT program in the College of Natural Science and Mathematics is a joint program established by the Physics Department in partnership with the Penn State University.
- ✓ The main reason behind establishing such a program was to (i) provide access to the educational resources in Nanotechnology to Educators/Students in Pennsylvania and (ii) to provide opportunities to our students so that they can earn 18 credits of Capstone experience in nanofabrication manufacturing technology either towards their APPY NMT BS degree or to get minor in NMT or a certificate of completion of the program in Nanotechnology.
- ✓ The NMT program has provided remarkable opportunities not only to the Physics students but also to students from the Biology department who wanted to pursue graduate degree in Bio-Med Engineering programs (see the Table 1 below).
- ✓ The Physics Department established a joint-partnership memorandum of understanding (MOU) between IUP and Penn State providing the following unprecedented benefits to our students:

    - Our PA-resident students will pay only the tuition for 18 credits to IUP at the prevailing rates and not the higher tuition rate charged by the Penn State University.
    - In addition, our PA-resident students will be given either free-room or free-boarding during their Capstone semester study at Penn State. The support of free room or boarding to our students was in fact provided by the Penn State through a grant from the Commonwealth of Pennsylvania.

- ✓ This excellent opportunity has provided the best education to several of our students which could have been otherwise impossible for them to get in the highly important and emerging field of Nanoscience and technology. In Table 1 we have compiled a list of students (in the last 5-years) who either received Certificate by completing 18 credits of Capstone semester at Penn State or earned the APPY-NMT BS Degree.

Table 1

Student Name	Capstone Semester	Current Status
Baccanti Joseph	APPY-NMT (2008)	Working in industry
Mayank Talwar	NMT (2008) Biology	PhD in Bio-Med Engn. at Gainsville, FL
Caitlin Williamson	NMT (2009) Biology	PhD at in Bio-Med Engn. in NY
Brain Laich	APPY-NMT (2010)	Internship in Nanotechnology in Japan
David Crumm	APPY-NMT (2011)	Graduating in Dec. 2011
Steven Paul Hensley	APPY-NMT (2012)	Graduating in Dec. 2012

Other equally important reasons for keeping the APPY NMT program

- ✓ Over the last 6 months the IUP Physics department has developed a brand new 3-2 dual degree BS Physics/Pre-Eng program (with University of Pittsburgh) – restoring it from the NASC Pre-Eng to Phys. Pre-Eng by creating a track under the BS Physics program. In the Fall of 2011, we will initiate an MOU with Penn State to expand the scope of the Pre-Eng program. Since the Pre-Eng students spend only 3 years at IUP – a Capstone semester (during the summer of their senior year) for Pre-Engineering students would be extremely valuable especially to those who want to enter into Bio-Med Eng., Material Science & Eng., Electrical or Chemical Engineering programs either at Pitt or PSU.
- ✓ In the past 3 months, the Physics department has been developing a new professional science masters (PSM) program *'Nanoscience for Industrial Materials'*. Before starting an internship with a nanotechnology company it would be extremely valuable for our PSM students to spend a few weeks (in the summer) to gain valuable hands on experience by taking at least 2 courses (6 cr.) of (i) Basic Nanotechnology and (ii) Materials Modification in Nanotechnology process courses at Penn State.

In summary, based on the above facts we are requesting to the IUP Administration please do not eliminate (APPY NMT) a very important and valuable program in the emerging field of Nanotechnology. Elimination of such a distinctive and high value program will have serious consequences on the education of CNSM students. The elimination of this program will also have severe impact on the newly created 3-2 Pre-Eng track in the BS PHYS program as well as on the PSM program that we are currently working on developing i.e., *"Nanoscience for Industrial Materials"*.

Again, with a strong support from the College Interim Dean (Dr. Zanich) and to get proper credit for the number of students graduating in the physics programs, we have created tracks for the Applied Physics/Nanotechnology/Electro-optics/Pre-Eng. under our BS physics program with one CIP 400801 classification. By the end of last Spring semester, all these changes have been approved by the College-wide curriculum committee and now they are with the University wide curriculum committee. Furthermore, the same course offerings each semester in our rotation plans would serve all students in the Pre-Eng./Appl Phys./Nanotechnology/Electro-optics tracks of the BS/BSED program making our program really cost effective.

Response to the College Dean about Graduate Program in Moratorium Prepared by the Physics Department

Devki N. Talwar

B) **PHYS MS** (thesis based): We are requesting to the IUP Administration please do not eliminate this program.

A Request

The physics department has been told that our MS program is set to be phased out beginning 2011 with final phase out in 2012. We spent the last 2 years evaluating new growth strategies for this program in light of our perceived new reality (grow the program or lose it). We are asking the University to re-evaluate that decision based on the following.

1) Stipends are not just a problem at IUP, stipends are a problem everywhere. Over the last few years we have noticed that even some of our best students, while eventually finding PhD programs, had difficulties finding programs with full stipends. The cost of a full stipend with tuition, fees and benefits to a PhD University now exceeds $50,000 for an out-of-state entering student. At these costs it is now cost effective for many of the schools to replace graduate students in the laboratory classes with temporary faculty.

2) There has been a complete restructuring of stipend distribution in our department in the last year that has significantly increased our numbers without additional stipends. All five of our new graduate students entered the program this year with either half stipend or no stipend with no reduction in student quality. In previous years this was unheard of. We believe that there is a change going on in physics postgraduate education that is driving this reality. We think that many of our new students applied to other schools and could not get stipends. In the end they chose the low cost alternative, IUP to continue pursuit of their goals. For students from Pennsylvania this opportunity only exists at IUP.

3) *Who are our customers?* We interview all of our incoming students to determine what they want to do, so we can best fit their needs. With very few exceptions over the last five years all of our student's express a desire to go on to do a PhD. The vast majority of them reach that goal. In this field the bachelor degree is an introductory degree. Most students leave the bachelor degree with a taste for the field but they have not reached a level where they can actually do physics or have any depth of knowledge. They are well aware of their level. At this stage the PhD looks extremely daunting and many think they'll try an MS first.

Our plan has been to go out and aggressively tap this customer base – visit (within the next few months) all of PASSHE schools as well as Pitt, Penn State and Duqesne, to do three things:

- ✓ Introduce potential MS physics students to the program we have at IUP and its success rate for students attempting to get into PhD programs.
- ✓ Offer to pay for the students application fee. Application fee costs are expensive especially now that students generally need to apply to at least 10 schools. We need to get them to apply and a free application seems to us to be the very best way. While they are applying to other schools they might as well apply to IUP, its free. We expect that there will be a good

number that may not get into any of the other schools at this point IUP should look very good as a low-cost, in-state alternative.

✓ Talk to students and begin to bring them in. Free IUP thumb drives might be a good marketing tool for this demographic (2 Meg about $6).

This was our business plan. We are hoping to get out numbers up to 7-8 new students entering the MS program each year. We wish to request the University put the MS programs phase out on hold until at least December 2013 where we will have had two opportunities to recruit in this manner. We also ask that we be given 3 assistantships (comparable to other MS programs) for 2012 and 2013 for this endeavor.

The Value of IUP's MS Program to the students of IUP

- We started the process of restructuring the physics department almost 3 years ago. Our goals were a better program, increased class size and improved retention. In the first stage the department spent a year developing a completely new course schedule based on a two-year rotation scheme. We melded the MS and BS programs to have significant overlap. For example we offer an undergraduate quantum mechanics (fall) and a graduate quantum mechanics (following spring), and undergraduate mechanics (fall) and a graduate mechanics (following spring) and an undergraduate statistical mechanics (fall) and a graduate statistical mechanics (following spring). We populate graduate students into the dual level courses and undergraduates have the opportunity to take advantage of higher-level courses, significantly improving their knowledge base. Undergraduates have been taking advantage of this opportunity.

- All of our graduate students are required to spend several hours a week in our tutoring room working with undergraduates on freshman physics. Freshman physics is one of the most difficult courses many students take and having a staffed tutoring room for the approximately 500 freshman we teach has been a great thing. We see graduate students and undergraduate students working in that room continuously all day and we are very worried about what the loss of this resource will do to our retention. Excellent student-grad student mentor relationships have evolved out of this program, which help many of these freshmen to excel and/or survive.

- While the department has been under new management for the last four years, the graduate program has been under new management for last five years. During this time we have seen an improvement in both student quality and enrollment (this year we have 10 graduate students in the program – the best enrollment figure in the last 10 years). Four years ago, the graduate coordinator Dr. Gregory Kenning, begin the process of increasing student access to high-quality experiments. Three years ago he received a $327,000 NSF grant to develop a materials research laboratory. We are now in the last year of the grant and all of that equipment is coming online. By building much of our own equipment we have parlayed this grant into close to $800,000 worth of equipment including an experimental apparatus that is absolutely unique in the world. Hands-on experimental research for students has greatly increased and this has added a palatable enthusiasm among both our graduate and undergraduate students. We currently have pending a $318,000 NSF (including $62,000 F&A) grant to both continue these experiments and fund graduate students. Out of this research we have developed a new type of electronics that the university is currently filing for a patent on. The MS degree is the backbone on which we have and can obtain these grants.

- We have begun the process of applying for an NSF STEM grant worth approximately $600,000. This grant is solely for student funding. The opportunity for receiving this type of grant is greatly enhanced by IUP having an MS degree.

The PSM Program

According to a recent American Physical Society (APS) report, there are 14 PSM Programs in Physics – related to Nanoscience, Applied Physics, Medical Physics, Health Physics and Engineering Physics. These programs consist of two years of academic training, along with a professional component that include internships and "cross-training" in business and communications. Such programs must be developed in concert with industry and need to be designed to dovetail into professional career opportunities. It should be emphasized here that the requirements and outcomes for the PSM program are very different – these are terminal degree programs. Our MS program prepares our students to go on to do PhD's in Physics. We believe that during the conversion to PSM only, we will lose our current student base and we are currently seeking to determine if there is an actual student base for this program.

In summary, although the Physics Department is engaged in developing PSM program *'Nanoscience for Industrial Materials'* we strongly feel that our PHYS MS (thesis-based) program is very distinctive and playing an important role in Academia and Society.

September 23, 2011

TO: Deanne Snavely, Dean, College of Natural Sciences and Mathematics

FROM: Raymond Pavloski, Chair, Department of Psychology

RE: Applied Track B.A. in Psychology

The faculty of the Psychology Department have discussed the issue of the Applied Track program at length. This program had been closed to majors for several years following retirement of Mario Sussmann, the faculty member who coordinated this program and who was the architect of much of its content. In the Fall of 2009, the Psychology faculty voted to have the program placed in moratorium, with the understanding that a program revision could be proposed. The deadline for having the revision through all stages of the curricular process would be Fall, 2013.

The same program was recently declared to be in moratorium by the Provost, and is in danger of being discontinued. The faculty unanimously voted to petition any decision to discontinue the program, arguing that the existing program provides a foundation for several possible program revisions that would be very valuable to our undergraduate majors. The faculty have begun the process of discussing various options for program revision, and will have a proposed revision completed during the 2012-13 academic year.

To: Natural Sciences and Mathematics Curriculum Committee
Dr. Deanne Snavely, Dean
From: Secondary Mathematics Education Committee (SMEC)
Date: September 23, 2011

This letter is in response to the plan which calls for a moratorium for the Masters of Education in Mathematics. This response was approved by the Secondary Mathematics Education Committee (SMEC) of the Mathematics Department on September 19, 2011.

The Secondary Mathematics Education Committee (SMEC) has labored to revise the existing M.Ed. in Mathematics program in order to increase enrollment and to support students to realize their professional goals. Due to the past and present low enrollment, SMEC concludes that a three-year moratorium of the program is appropriate. During this time, a committee will revise and convert the existing program to an online program. The preliminary investigation and a recent survey conducted by the committee show there is a need for a revised program. Furthermore, an online system of delivery will enable IUP to recruit from a national audience.

The rationale given in the "Workforce Plan and Program Moratorium/Elimination" memo for putting the M. Ed in Mathematics in moratorium was "Teacher certification changes impact this major". Further clarification indicates that some of the "discipline-specific majors are inconsistent with new requirements for continuing certification" (as indicated from Dean of COE-ET).

As work progresses on converting the M.Ed. in Mathematics program to an online format, SMEC will make sure that the program is consistent with new Pennsylvania Department of Education (PDE) requirements for continuing certification. The new PDE requirements for Level II Teacher Certification must include 6 credits in the area of Inclusive Classrooms and / or in the area of Standards Aligned Systems (SAS). Since most of the students who will be completing this program will be current teachers, it is imperative that we provide a program that both improves their teaching and helps them gain Level II Certification through PDE.

SMEC and the Mathematics Department are hopeful that there is commitment throughout the campus so that the current students can complete the already begun program.