

Year-Three Review  
Department of Physics

2019-2020

The most recent external review of the Department of Physics was performed in April of 2016 and the Post-APR meeting with UMBC Senior Administration took place in September of 2016.

The Post-APR Action Plan agreed to by the Provost's office, the Dean of CNMS, and the Department, contained five recommendations. We address the status of those recommendations individually, below. The original recommendation of the external reviewers is shown in *italic*. The Department commentary and the current status of each topic is discussed below each recommendation.

Post APR Action Recommendation #1

1. *The addition of five TA lines, with the multiplicative effect of additional externally funded funded RA's, would address several areas of the university's strategic plan.*

The multiplicative effect mentioned by the reviewers is due the fact that the Physics department has historically and continues to fund about twice as many graduate students on externally funded RAs as compared to the number of TAs funded with University support. The Dean supported the need for more TA lines in Physics and made a budget request that resulted in the addition of 2.8 TA lines in Physics starting in the Fall of 2019. **The external reviewers and our internal self-study identified the need for 5-6 additional lines; 2.8 new lines is very helpful, but only about halfway to the need established in 2016.**

Post APR Action Recommendation #2

2. *The new faculty need more space and now is the perfect time to allocate available space in the physic building.*

This comment was mostly addressing the anticipated availability of the CAHSS offices in the Physics building. CAHSS has now vacated the Physics building. Nearly all of their space went into the creation of a University-wide interdisciplinary center, the Earth and Space Institute (ESI). The CAHSS offices are now used by ESI. In conjunction with that space re-allocation, Physics reclaimed one office that was being used by CSST (Center of Space Science Technology) and were given two offices that CAHSS had been using. We immediately filled those three offices with one new faculty member, two post-docs, and two visiting scholars and summer instructors. Thus, we now have 5 teaching/research faculty in the same space that was previously occupied by three office personnel. The space issue continues to get worse however, since every new faculty member we have hired recently is much more research active than the majority of the retiring faculty and hence needs space for their students and post-docs. Recently, two CSST business offices that currently reside in the ESI space in the Physics building, have been vacated as those functions have been subsumed by JCET personnel who are housed in the Research Park. **The Physics Department suggests that those two offices (PHYS 325 and 326) be assigned to the Physics Department.**

Post APR Action Recommendation #3

3. *The Atmospheric Physics program would be enhanced with the addition of at least one more faculty member.*

The Dean supported the idea of a strategic hire in this area but budgetary difficulties did not allow that hire to take place until the Spring of 2019. During that semester, we hired a Research Assistant Professor in the Pre-Professoriate track, who, if successful, will convert to a tenure track Assistant Professor in FY2022. Last year, we also had an Atmospheric Physicist retire (Dr. Lynn Sparling). We are currently involved in a nationwide search to fill that opening.

Unfortunately, we are down three additional tenure track lines since the Fall of 2019. We have had one death and two other retirements. **These losses combined with the likelihood of 5 more retirements in the next 5-7 years, all of whom are experimentalists, makes it critical that not a single year go by over the next several years that we are not searching for new young faculty.**

In general, the size of the tenure track faculty is too low in comparison with other PhD granting departments in the country. Figure 1 (inset) shows that over the past 20 years, the number of Physics majors has grown considerably. The number of tenure track FTEs has only gone from 16.5 to 20 during that same time. The recent death and retirements have lowered that back to 17 FTEs.

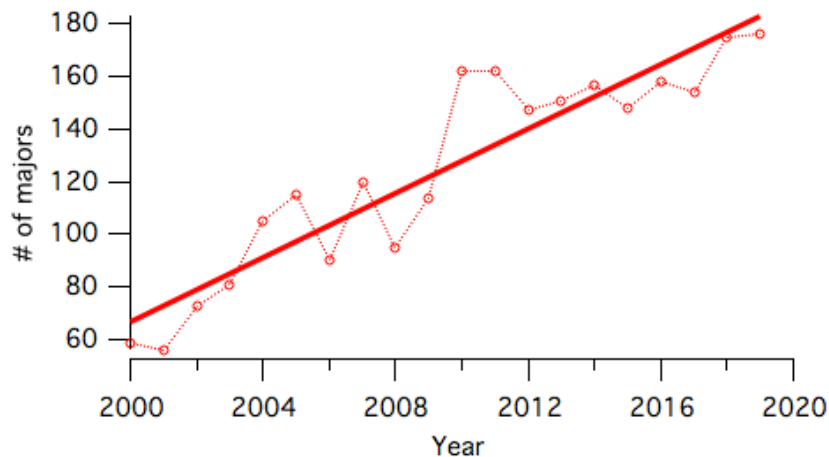


Figure 1. Number of degrees granted per year in the Department of Physics and (inset) the number of physics majors by year. Significant growth in the number of majors and BS degrees has occurred during the past 20 years, yet the number of faculty have not grown in proportion and operating budget has been essentially flat.

Figure 2 shows that compared to other PhD granting departments across the nation, our department is about 50% smaller, given the number of undergraduate degrees that we award.

We should be near the tip of the arrow rather than within the bar (red). (The bar represents our FTEs before the death and retirements, it is 3 FTEs lower now.)



Figure 2. Number of BS degrees awarded compared to the size of the department. The median size faculty that produces as many BS degrees as we do is roughly 38 faculty, almost twice the size of our faculty.

**The Department believes a plan should be developed to increase the number of tenure track faculty from the current level of 17 FTEs to 22-24 FTEs in the next five years. This level would still be significantly below the size of other departments around the country with our current level of productivity. Due to the large increases in science and engineering majors at UMBC and due to the pressing need to offer more electives to majors and a more complete set of courses for the graduate programs, this increase in faculty size is critically needed.**

#### Post APR Action Recommendation #4

*The department needs to consider a change to its upper-division undergraduate curriculum to allow more advanced study (that is, follow-on semesters in E&M and quantum mechanics) and to move quantum mechanics to the first semester of the senior year to facilitate better preparation for the GRE.*

The Department considered each of these suggestions. We moved Quantum Mechanics to the Fall as suggested. The Department's assessment program had also identified these issues. The basic suggestion to offer two upper level E&M courses and two quantum mechanics courses is not the standard across the physics departments in this country. Many departments do this, but many do not. We are evaluating the best route for us, given the State limit of 120 credits per degree and limited faculty. Adding two more courses would mean deleting two other courses. These could come from the elective pool, but then the students would not have a broad exposure to topics not found in the required sequence. Currently, we feel that adequate follow-on advanced study opportunities in these two areas are well served by our introductory graduate level courses in these areas. Advanced undergraduates can and do take these courses as needed and desired to augment their studies.

#### Post APR Action Recommendation #5

##### 5. *Evaluation of Assessments.*

The new department assessment program had just been initiated at the beginning of the external review so no results were available at that time, but the reviewers commented, *“The new assessment plan is very ambitious and the department should be credited for focusing on specific issues in its assessment goals.”* We now have 3 years of data from this program and find it to be working quite well. We have good buy-in from the faculty in collecting the data and a committee of three faculty who analyze the data (yearly) for each of our graduate, undergraduate, and service courses and make recommendations. We devote one whole faculty meeting each Fall to discuss the recommendations and to formulate any necessary changes.