**Addressing DSJ by Revising Major Requirements for the Sciences**

**Overview**

It is useful to critically examine all elements of the educational process from the perspective of how these elements impact diversity and social justice. Issues in DSJ are inherently *intersectional* insofar as they often involve the intersection between different forms of oppression (e.g., a poor woman of color faces challenges of racism, sexism, and classism in her educational path). Issues of race and class in society intersect to create disproportionate impacts on the educational preparedness of students, and this can lead major requirements to have disparate impacts on students.

**Context for Analysis and Discussion**

One of our overarching goals at CSU East Bay is to address the underrepresentation of women and minorities in the fields of science, technology, engineering, and mathematics (STEM). However, the needs of many students of color for remediation in college math made STEM major programs inaccessible to them. 🡪 *Do our STEM major course requirements unintentionally create disparate impacts for diverse students?*

In 2011, 73% of the incoming first-year students at CSU East Bay were not ready for college math and required remediation. Thus from the start, if a STEM major program is not carefully designed to be accessible to students requiring remediation in math, a large percentage of students are excluded from pursuing that STEM degree from the beginning of their college careers. Furthermore, according to a report from the National Center for Education Statistics, in 2007-08, Black and Hispanic students were 50% more likely to be enrolled in remedial courses. Thus STEM major programs that are inaccessible to students needing remedial math courses will also be disproportionately inaccessible to students of color. 🡪 *How can we create STEM degree programs that are attractive and achievable for students who may require remediation in math?*

**Case Study: Revising Physics B.A. Degree Requirements To Benefit Students of Color**

The Department of Physics offers both a B.S. and a B.A. degree in Physics. Because of the relatively small number of majors, upper division courses are presently taught only every other year. Thus in order to graduate in four years, Physics majors need to complete heavy loads of math-intensive upper division courses as Juniors and Seniors, and if they miss or fail a course, their graduation can be set back by at least two years. Obviously the additional costs of delayed graduation disproportionately impact poor students, and because of the intersection between race and class, there are likely disproportionate impacts on students of color.

The present B.S. and B.A. curricula are in fact quite similar: the B.S. degree requires 110 units and the B.A. degree requires 97 units which does little to reduce either the course load or the time to degree completion. Furthermore, almost all Physics majors in the last decade have earned B.S. degrees. Sample schedules for the present B.S. and B.A. degrees are shown below in Table 1, with the courses not required for the B.A. highlighted in blue.

**Revisions that give B.A. Students a Firm Foundation for Work in High-Tech Industry and K-12 Education**

Considering the above issues, the Department of Physics has been considering the possibility of revising the Physics B.A. degree requirements (to only 70 rather than 97 units) and our annual course offerings to significantly reduce the time to degree completion for a B.A. degree while still meeting our demanding student learning outcome (SLO) goals. The Physics B.A. will still cover all essential areas of physics study and give a firm foundation for students seeking employment in high-tech industry, but some of the advanced topics primarily important for graduate study and physics research will no longer be required. This, coupled with a few additional annual offerings of upper division courses, will enable Physics B.A. degree completion with only 1 year of upper division coursework. This revision should significantly ease completion of the Physics B.A. degree for students that need remedial work in math or choose to pursue a Physics degree later in their college career. A sample schedule for the new proposed Physics B.A. degree is shown below in Table 2.

***Table 1.* Sample schedule for Physics B.S./B.A. degrees, with highlighted courses not required for the B.A.**

|  |  |  |
| --- | --- | --- |
| **Year 1** |  |  |
| **Fall** | **Winter** | **Spring** |
| PHYS 1001 (5 units) | PHYS 1002 (5 units) | PHYS 1003 (5 units) |
| MATH 1304 (4 units) | MATH 1305 (4 units) | MATH 2304 (4 units) |
|   |   |   |
|  |  |  |
| **Year 2** |  |  |
| **Fall** | **Winter** | **Spring** |
| PHYS 2004 (5 units) | PHYS 3180 (4 units) | PHYS 4850 (1 unit) |
| MATH 2305 (4 units) | CHEM 1102 (5 units) | MATH 2101 (4 units) |
| CHEM 1101 (5 units) |   |   |
|  |  |  |
| **Year 3** |  |  |
| **Fall** | **Winter** | **Spring** |
| PHYS 3301 (3 units) | PHYS 3302 (3 units) | PHYS 3303 (3 units) |
| PHYS 3101 (3 units) | PHYS 3102 (3 units) | PHYS 3281 (4 units) |
| PHYS 4250 (1 unit) | PHYS 3280 (4 units) | PHYS 4600 (3 units) |
|  |  |  |
| **Year 4** |  |  |
| **Fall** | **Winter** | **Spring** |
| PHYS 4001 (3 units) | PHYS 4002 (3 units) | PHYS 4003 (3 units) |
| PHYS 3151 (3 units) | PHYS 3152 (3 units) | PHYS 3283 (4 units) |
| PHYS 4250 (1 unit) | MATH 3331 (4 units) | PHYS 4700 (3 units) |
|   |   | PHYS 4950 (1 unit) |

***Table 2.* Sample schedule for new proposed Physics B.A. degree**

|  |  |  |
| --- | --- | --- |
| **Year 2** |  |  |
| **Fall** | **Winter** | **Spring** |
| PHYS 1001 (5 units) | PHYS 1002 (5 units) | PHYS 1003 (5 units) |
| MATH 1304 (4 units) | MATH 1305 (4 units) | MATH 2304 (4 units) |
|   |   |   |
|  |  |  |
| **Year 3** |  |  |
| **Fall** | **Winter** | **Spring** |
| PHYS 2004 (5 units) | PHYS 3280 (4 units) | PHYS 4850 (1 unit) |
| MATH 2305 (4 units) | PHYS 4250 (1 unit) | MATH 2101 (4 units) |
| PHYS 3180 (4 units) |   |   |
|  |  |  |
| **Year 4** |  |  |
| **Fall** | **Winter** | **Spring** |
| PHYS 3301 (3 units) | PHYS 3302 (3 units)  | PHYS 3151 (3 units) |
| PHYS 3101 (3 units) | PHYS 4001 (3 units) | PHYS 3281 (4 units) |
|   |   | PHYS 4950 (1 unit) |