THE UNIVERSITY OF NORTH CAROLINA AT ASHEVILLE
FACULTY SENATE

Senate Document Number 10416S
Date of Senate Approval 05/05/16

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Statement of Faculty Senate Action:

APC 87 (JEM): Joint Engineering Program's Petition for Exemption to the Major/LAC Credit Hour Cap

Dear Academic Policies Committee Members:

Please accept this document as the Joint Engineering Program's Petition for an Exemption to the major/LAC credit hour cap outlined in SD 1814F for the BSE – Concentration in Mechatronics. This major currently (see 2015-16 UNC Asheville Catalog) requires students to complete 120-124 credit hours to obtain their degree:

- 67 credit hours of course work "Required for Major"
- 31 credit hours of "Required Correlate Courses"
- 26 additional credit hours of course work within UNC Asheville's "Liberal Arts Core."
    - (3) LA 178
    - (4) LANG 120
    - (4) HUM 124
    - (4) HUM 214
    - (4) HUM 324
    - (0) Lab Science – (4) PHYS 221 is a required correlate course
    - (0) Scientific Perspectives – (3) CHEM 132 is a required correlate course; it is currently approved as a SP course as a former ILSN cluster course.
    - (0) MATH Requirement – (4) MATH 191 is a required correlate course
    - (0) Social Science Requirement – (3) ECON 102 is a required correlate course.
    - (0) Second Lang – Expected to test out (NCSU requirement is satisfied by two years of the same high school foreign language with a grade of C- or better)
    - (3) ARTS Requirement
    - (4) HUM 414 or LA 478
    - (0) Diversity Intensive – (3) Expected to take a DI ARTS course
    - **(26) LAC Total**

Relevant Program History

The BSE – Mechatronics degree was originally created and accredited by ABET as a [2+2] degree that was offered exclusively on the campus of UNC Asheville (UNCA). Operationally, the students applied to, were accepted at, and enrolled at UNCA for their freshmen and sophomore years; they administratively transferred to NC State University (NCSU); and they completed their junior and senior years on the UNCA campus because the degree is only offered on the UNCA campus. The "original" version of the BSE – Mechatronics was decommissioned by ABET in the spring of 2011. During that same accreditation cycle, ABET accredited the "current" version of the BSE – Mechatronics as a truly "joint" degree, i.e., students now graduate simultaneously from UNCA and NCSU and receive a single joint diploma.

The curriculum delivery expectations for the "original" BSE – Mechatronics were the College of Engineering (COE) at NCSU delivers the engineering course work (generally 68 hours) and UNCA delivers correlate (31 hours) and general education (28 discrete hours plus correlate efficiencies). The vast majority of the engineering credit hours were delivered synchronously via video teleconference technology by COE NCSU faculty in Raleigh. Some courses were delivered by NCSU faculty located at UNCA or by UNCA faculty appointed as adjuncts in the COE at NCSU. The only non-adjunct UNCA employees associated with the "original" iteration of the program were Diane Morgan, Administrative Assistant to the Director of the Joint UNCA-NCSU Engineering Programs, and Dr. Rebecca Bruce, Professor of Computer Science, who had a halftime appointment as UNCA's Associate Director of the Joint UNCA-NCSU Engineering Programs; Mrs. Cheryl Alderman was NCSU's Associate Director of the Joint UNCA-NCSU Engineering Programs. Associate Directors Bruce and Alderman both taught and facilitated courses.

During their site visit, the ABET accreditation team recognized the unique nature and value associated with the UNCA-NCSU joint effort, which was and remains a collaboration between two very different institutions within the UNC System – the designated liberal arts university and the flagship land grant university. While they were highly supportive of what was being accomplished with technology, they also identified two related aspects of the program that were problematic:

(1) The degree had a required, two-semester design-focused capstone experience and a very limited number of faculty on site to mentor these students; how would the inevitable growth in the going be handled, especially in the local, hands-on courses?

(2) Having a very small number of local faculty, all of whom were appointed outside of the contributing departments [Electrical and Computer Engineering (ECE), Material Science and Engineering (MSE), and Mechanical and Aerospace Engineering (MAE)], meant that the mechatronics curriculum was under the control of faculty in other departments.

Current Degree Credit Hour Distribution

- 32 credit hours ECE typically VTC
- 24 credit hours MAE typically VTC
- 03 credit hours MSE typically VTC
- 08 credit hours E and EGM typically local

(Now that mechatronics has become a recognized discipline and grown in the US and around the world, this is analogous to having a biochemistry curriculum offered jointly by Biology and Chemistry departments and the curriculum controlled by botanists, zoologists, entomologists, organic chemists, analytical chemists, and physical chemists when folks can earn Ph.D.s in biochemistry, which has been the norm for sometime.)

Because of these identified issues, the Dean of Natural Sciences (Keith Krumpe) and the most recent Director of the Joint Engineering Program (Steve Walsh) developed a plan to increase the number of UNCA employees (faculty and staff) within the program:

- Dr. Rebecca Bruce is now fulltime in Engineering.
- Mr. Neil Rosenberg has been hired as a fulltime lecturer in the program.
- Sara Sanders, who is a graduate of the program, was hired to operate the program's design and fabrication facilities.
- The next GlaxoWellcome Professor will be hired as the first UNCA Director of the Joint Engineering Program.
- Susan Reiser, who is a computer scientist with design and fabrication experience, is now co-teaching the capstone senior design courses and part of the team that has been developing the Creative Fabrication course.

Dean Krumpe and Provost Urgo have also been involved in negotiations with the NCSU Provost and COE Dean about restructuring the reporting lines for the program. Prior to his departure, Dr. Walsh, like the NCSU employed Directors before him (all were EPA non-faculty), reported directly to NCSU COE Director of Distance Education Programs/Engineering Online with dotted reporting lines to the Associate Dean for Academic Affairs in the NCSU COE and UNCA's Dean of Natural Sciences. In addition to being cumbersome at best, the lack of local administrative control and the classification of a joint and completely local program as a distance education /online program is highly problematic. The reporting structure that is currently being discussed is one that would have a UNCA employed Director reporting to the UNCA Dean of Natural Sciences who in turn would report exclusively to the NCSU Associate Dean for Academic Affairs.

Rationale for a Credit Hour Cap Exception

Unlike in Europe and Japan, where mechatronics engineering is firmly established and recognized as an important area of engineering, mechatronics in the United States is in its infancy as a discipline. Of the 479 four-year engineering programs

accredited by ABET, there are only five that offer a bachelors degree in mechatronics engineering.

Institution	**Program Size**
California State University Chico	132 units
Kennesaw State University	129 credits
Purdue University Calumet	123 credits
UNC Asheville/NC State University	**124 credits**
Vaughon College of Aeronautics and Technology	134 credits

Unlike the other four programs, the UNC Asheville/NC State University joint program is the only collaboration between two institutions. Moreover, it is the only program offered at a liberal arts institution.

As can be seen from the program size data presented above, UNC Asheville's BSE – Mechatronics program is currently well within the norm for mechatronics engineering programs; even with the proposed changes that would take the degree requirements to the system maximum of 128, it would remain in the middle of the program size range.

The UNC Asheville-NC State University collaboration is an example of two institutions, North Carolina's designated and nationally recognized public liberal arts university and its flagship and premiere land grant university, coming together to provide students with an outstanding educational experience that brings together the best of what each institution has to offer. Today's program with its joint degree and simultaneous graduation from both universities is very different in structure and number of students served from the [2+2] program that was envisioned more than three decades ago. It is also in the midst of additional significant change as the partnering institutions create new infrastructure and discuss ways to reconfigure the administrative structure and faculty distribution within the program.

The additional four credit hours of requirements are modest and driven by the faculty and staff in Asheville, not Raleigh. They are intended to modestly expand the percentage of the curriculum that is uniquely mechatronics and presented by local faculty. These curriculum changes are in the spirit of the student experience at UNC Asheville as opposed to the tradition electrical and mechanical curriculum and experience offered at and shared with UNC Asheville via video teleconference technology.

When and if the proposed restructuring of this program comes to pass, future curriculums will contain more coursework that originates locally and directly targets Mechatronics, but the large majority of the engineering coursework will still be provided by NC State University. As such, a 4-year semester-by-semester plan listing the Program's anticipated engineering course offerings and the instructors for each of those courses has little relevance to this petition because those courses are not staffed by UNC Asheville faculty.

Because the Mechatronics Program is an engineering program offered jointly with NC State University, it is not possible to deliver this program within UNC Asheville's current 100 credit hour cap. This is evidenced in the credit hour requirements for Mechatronics degrees at other institutions and it can be seen in the credit hour requirements for any engineering program offered by NC State University. Mechatronics is the only engineering program offered at UNC Asheville and it is the only program of its sort in the UNC system. It is important to recognize the special needs of this program to enable its continued existence on the UNC Asheville campus.