Associate Provost Anne Alexander referred a proposal for a Bachelor of Science (BS) in Computer Engineering Technology for the Industrial Internet of Things (CET-IIOT) to the Academic Planning Committee (APC) for review and recommendation. This is essentially the same proposal that the Faculty Senate voted not to recommend in April 2019. After careful consideration, the APC has again voted unanimously[1] not to recommend the program. This recommendation is based on the same concerns previously expressed, namely poor student demand coupled with relatively high ongoing costs and uncertain value for students who could have a far more lucrative computer engineering degree with a few more classes.

The proposed program is a 2+2 plan to be jointly offered by Casper College, UW Casper, and the UW CEAS. The investment in the program ($500,000 annually in perpetuity, by AY24-25, p. 2) is said to be appropriate because it "would create in Casper a very new, highly technical, lab intensive, four year ABET-accredited program which differs markedly from anything offered at UW." While that may be true, the proposal does not provide a convincing case that sufficient student demand, student value, or pressing state need for the program exists to justify such significant new and ongoing expenditures.

First, there are several objective reasons to be skeptical of student demand. While the program projects enrollment of 25 resident and 25 non-resident students by AY24-25 (p. 11), the rationale for these projections is not elucidated. In 2016, only 434 CET degrees were awarded *nationwide*, and institutions with much higher enrollments than UW graduate very few students annually – on average only 9. The largest program nationwide has shrunk 25%. Moreover, the program assumes a 2+2 model, but the potential feeder programs at Casper College graduate only a small number of students. The proposal concedes that it is difficult to predict how many, if any, students that start in Laramie would be willing to move to Casper to complete this degree. Further, demand for this degree will be challenged on both ends: on the upper end by students who elect to instead complete the more rigorous and profitable computer engineering degree and on the lower end by students who opt to enter the workforce after completing a two-year program. Gray's data lists student demand at -2 (p. 6).

Perhaps most concerning, even if the program could generate student demand, it is not at all clear that students would be well-served by this program. Salaries for technicians (two-year program) and technologists (proposed four-year program) are identical. Financially, there appears to be little or no advantage to completing the technology degree. Likewise, most jobs either require a computer engineering degree or accept an associate's degree (if any degree is required at all). Moreover, salaries for both technicians and technologists have remained "flat for over the past 40 years (remaining at an average of about $50,000 annually, in 2015 dollars)" (p. 2).

In contrast, average real wages for engineers have risen 23% annually over that timeframe. The four-year engineering degree (already in place at UW) is a far better investment for students, especially since the technologist degree will also entail Calculus II. With three more math

[1] The Dean of UW-Casper abstained from voting, however.

classes, students can obtain a computer engineering degree that will enable them to command $20,000 more per year for the duration of their careers. They will also become eligible for substantially more jobs and for licensure in all states. It is argued that the CET-IIOT is a better option for those students who desire a more hands-on education than provided by the theoretically oriented engineering degree, but a technician degree is also hands on, equally lucrative, and takes half the time to complete.

Apart from the lack of remuneration to be gained from the degree, employer demand does not appear robust. According to the initial CET proposal, Gray and Associates data rates CET programs "4" online and "6" on the ground, reflecting low employer demand.[2] An "unscientific survey" of companies that recruit from the UW computer science engineering programs indicated mixed interest in hiring job candidates with a CET degree. The proposed degree also aims to provide a concurrent secondary education major plan for licensure in Wyoming, but the requirements of the proposed CET-IIOT degree appear to extend far beyond what is taught in Wyoming high schools. Moreover, very few CET graduates pursue an education career (p. 5), and a Computer Science Certification that requires only 20 credit hours is already available at UW (http://www.uwyo.edu/education/current-students/certificate-endorsement.html). The new proposal does present some job posting data that suggests promise with an IIOT-oriented program, but such data fails to link job postings to required credentials and to salaries. If a bachelor degree is not required for the jobs posted, as is often the case for CET jobs, the jobs posted do not necessarily support implementation of a costly new four-year degree program. Similarly, if such jobs do not command any higher salary than may be obtained without a degree, they would not materially change the committee's analysis.

Also worrisome, the engineering faculty appears to share some of the APC's concerns. The Electrical and Computer Engineering Advisory Board approved a draft of the degree proposal only on a split vote. The Board members' comments reflect that significant concerns were expressed about the cost of and demand for the proposed program, even by those who voted in favor of the proposal.

In sum, there is little evidence the CET-IIOT degree is a wise investment of University resources during a period of austerity in which many well-established programs lack adequate funding. The considerable annual expenses associated with this program would be difficult, if not impossible, to reduce once the program is launched if demand does not materialize. There is reason to be skeptical of student demand and significant concern that students could be made worse off if they graduate and have no better salaries than they would have had without the degree. For these reasons, the APC recommends that the Faculty Senate not recommend implementation of the degree program at this time.

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[2] The revised proposal presents a somewhat higher overall score for CET from Gray's, but no explanation is provided for the change.

This recommendation could be revisited, however, upon evidence of greater student demand or of significant state need. The former head of Forward Casper as well as Casper College support the CET-IIOT program, and there is some suggestion, although hard to quantify, that such support is more widespread. Without question, it is important that UW work to serve the whole state and the Casper area in particular.[3] It is not currently clear that this program is the best means to do so. If UW targeted the Casper area with one new program (for UW-Casper, a 2+2 with Casper College, and local needs), would this program be the first priority? Or, do the supporters merely support any investment in the area? The answer is not clear. If the business community in Casper committed to supporting this program financially long term, it would strengthen the case by demonstrating depth of support while also decreasing the university's risk. Even without such commitment, perhaps the administration should be free to implement this program if necessary for state need, after recognizing that the program does not appear justified as an academic priority under currently offered evidence.

[3] The APC supports UW-Casper and encourages the university to explore investment in programs with higher student demand there.