



External Evaluation Report

Form 2D

Version 201-08-02

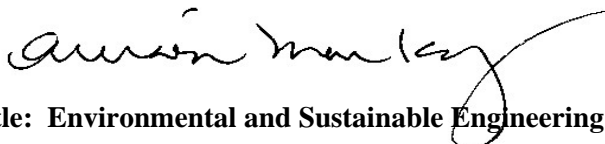
The External Evaluation Report is an important component of a new academic program proposal. The external evaluator's task is to examine the program proposal and related materials, visit the campus to discuss the proposal with faculty and review related instructional resources and facilities, respond to the questions in this Report form, and submit to the institution a signed report that speaks to the quality of, and need for, the proposed program. The report should aim for completeness, accuracy and objectivity.

The institution is expected to review each External Evaluation Report it receives, prepare a single institutional response to all reports, and, as appropriate, make changes to its program proposal and plan. Each separate External Evaluation Report and the Institutional Response become part of the full program proposal that the institution submits to SUNY for approval. If an external evaluation of the proposed program is required by the New York State Education Department (SED), SUNY includes the External Evaluation Reports and Institutional Response in the full proposal that it submits to SED for registration.

Institution: University at Albany

Evaluator Name (Please print.): Allison MacKay, Ph.D.

Evaluator Title and Institution: Professor and Chair, Department of Civil, Environmental and Geodetic Engineering, The Ohio State University

Evaluator Signature: 

Proposed Program Title: Environmental and Sustainable Engineering

Degree: Bachelor of Science

Date of evaluation: February 20-21, 2018

I. Program

1. Assess the program's **purpose, structure, and requirements** as well as formal mechanisms for program **administration and evaluation**. Address the program's academic rigor and intellectual coherence.

The purpose of U. Albany Environmental and Sustainable Engineering (ESE) program is to prepare students to practice and ultimately seek licensure in the field of environmental engineering. Throughout the U.S., there is a need of for bachelor graduates with such training to develop engineering solutions to problems associated with legacy urban development (aging drinking water infrastructure, ecosystem perturbations by wastewater discharges, stormwater management, hazardous and industrial site remediation, outdoor and indoor air quality) and to problems associated with continued urban development under shifting climate regimes (flooding, watershed management for human and ecosystem services, ecological system preservation and restoration).

The structure of the ESE program, as detailed by the curriculum matrix, provides a reasonable pathway for students to build their skills as environmental engineers. The first 1.5 years of curriculum are foundational math, science, computer programming, and concepts of the engineering design process. Students then take a sequence of core courses that are the basic engineering science and design courses relevant to environmental engineering design. These courses touch on all of the major areas of environmental engineering practice – water treatment, air treatment,

hazardous waste management, and physical transport processes in air, water and subsurface environments. Finally, students specialize in technical electives in areas related to water treatment, air pollution and atmospheric processes and public health. A capstone design experience in students' final semester is planned to integrate 'real-world' projects by capitalizing on relationships developed with industry and government partners in the Albany area. Overall, this program structure will prepare students for practice in environmental engineering as well as capitalizing on unique strengths available at U. Albany (see Q2 for details).

The structure of the ESE program is organized appropriately to meet the stipulated program criteria and student outcomes as detailed by the accreditation organization, ABET, which accredits programs in environmental engineering and other related fields. ABET accreditation of a Bachelor of Science program is necessary for graduates to seek licensure as a Professional Engineer in the field of environmental engineering. In the field of environmental engineering, professional licensure is a critical requirement for practitioners because they are developing engineering designs that protect public health.

The requirements of the ESE program are reasonable. There are some constraints that are imposed by state and internal requirements that add some unnecessary content for students who are majoring in environmental and sustainable engineering. If state requirements of basic engineering preparation are revisited, Mechanics of Materials could be removed from the curriculum as it is not critical to environmental engineering practice. Similarly, a reexamination of the pre-requisite requirements of Probability and Statistics could remove Discrete Structures from the environmental engineering course requirements. It is worth noting that the accreditation process for environmental engineering programs allows for a mix of engineering science and engineering courses so this provides some flexibility to constructing curriculum to prepare students to be practitioners.

Although a formal governance structure for the ESE program has not yet been established, the College of Engineering and Applied Science emphasis on establishing an advisory council will allow for feedback and input about student preparation and curriculum development.

The on-campus meetings provided additional information about the management plan for the ESE department as it relates to the College of Engineering and Applied Sciences. There are plans to include add financial personnel and academic advisors at a rate of one each per two departments. Given the proposed faculty and student size projections, such a staffing plan should provide adequate staffing support for faculty to manage research-related purchases and for undergraduate students to receive appropriate support. It is important that the Vice Provost for Research assign sufficient sponsored research support for ESE and other College faculty as this will be a grant-intensive department.

2. Comment on the special focus of this program, if any, as it relates to the discipline.

One very important strength to the ESE program is its creation in the absence of a civil engineering or chemical engineering major program. Environmental engineering programs that have been created in the conventional fashion, as an outgrowth from civil or chemical engineering programs, can be hampered by their requirements to be tethered to teaching requirements of the originating program. This situation limits the extent to which innovation can be introduced to programs. In the case of the ESE program at U. Albany, it has been developed as a comprehensive whole that has allowed sustainability concepts to be integrated throughout the sequence of coursework. Further, the ESE program design capitalizes on the strengths of atmospheric sciences and public health that are well-established at U. Albany (including direct ties to state government agencies in each case). By playing to these strengths in the decisions of required core courses and the design of upper division electives, the ESE program will offer a unique experience that is not available in most environmental engineering programs. This will allow the U. Albany to separate itself as a distinct offering from the other 70+ accredited environmental engineering programs.

3. Comment on the plans and expectations for self-assessment and continuous improvement.

The U. Albany has an established robust procedure for program self-assessment and continuous improvement. This institutional program aligns well with the required continuous improvement required as part of the ABET accreditation process. As a new program, ESE will benefit from a model of continuous improvement at the outset that will set the culture for regular examination of program outcomes.

4. Discuss **the relationship** of this program to other programs of the institution and collaboration with other institutions, and assess available support from related programs.

The ESE program at U. Albany has close ties to the Atmospheric and Environmental Sciences and Public Health programs. Leaders of both of these programs recognize the complementarity with the ESE program and the opportunity for collaborative interactions between the majors through required and elective courses, research and experiential learning experiences. No reservations or limitations of these collaborations were identified. In fact, the close ties of these programs to state agencies (Public Health, MESONET) can introduce ESE students to the role of environmental engineering in governance, a career pathway that is not often chosen by engineers.

Addition of the ESE program to the College of Engineering and Applied Sciences offerings will expand staffing needs for the required math, physics and biology courses that are taught in the College of Liberal Arts and Sciences. The proposed budget appears to account for additional funds to support teaching and recitation needs in these other departments to address requirements for the 50 students per year in the ESE program.

5. What is the evidence of **need** and **demand** for the program locally, in the State, and in the field at large? What is the extent of occupational demand for graduates? What is the evidence that demand will continue?

The provided evaluation of environmental engineering bachelor degree graduate needs in the area and the State appear reasonable. The U. Albany is regionally isolated from other environmental engineering programs at public institutions. Environmental engineering programs do not seem to draw from the same cohort of students as interested in environmental sciences so there is likely little impact on the Environmental Sciences and Forestry program at Syracuse. Environmental sciences typically attracts students who are interested in conservation and environmental management whereas, environmental engineering students are typically interested in treatment processes and the associated public health protection. Nevertheless, collaborative teaching arrangements have been outlined for a formal arrangement between ESE and the Environmental Sciences and Forestry program.

Environmental engineering has strong national demand which is likely also reflected in the urban Albany area where issues of stormwater management, aged water and wastewater infrastructure and industrial site remediation prevail. The population base of about one million people in Albany should have a large enough practitioner need to accommodate a good fraction of graduates from the ESE program. Further, the availability of an engineering program in Albany should be appealing to students who have constraints to seek educational opportunities close to home. As the program develops, the inclusion of graduate tracking and interactions with lead employers in the Capital area can provide feedback to ensure that the ESE program is right-sized for graduates to have placements.

II. Faculty

6. **Evaluate the faculty**, individually and collectively, with regard to training, experience, research and publication, professional service, and recognition in the field.

The current ESE department chair has given thoughtful consideration to the details necessary to launch and staff a new engineering program. Additional details about other departmental faculty were not available at the time of the external review because candidate interviews were still in progress. Given the commitment necessary to mentor new assistant professors to success, the program should consider inclusion of mid-career hires in the next round of hiring. Attention must be paid to balancing program needs for new course preparations against the time commitment for early career faculty to establish their programs of scholarship.

7. **Assess the faculty in terms of number and qualifications and plans for future staffing.** Evaluate **faculty responsibilities** for the proposed program, taking into account their other institutional and programmatic commitments. Evaluate faculty **activity in generating funds** for research, training, facilities, equipment, etc. Discuss any **critical gaps and plans for addressing them.**

The plan to staff the ESE program is reasonable. Hires are staged to follow the advancement of student cohorts through the new program. Initial teaching loads also take into account the need to initiate graduate programs that will support the research mission of hired faculty. The total numbers of planned faculty will ensure that the undergraduate program will be delivered and that faculty will be able to sustain graduate programs because there are enough faculty to recruit a sustaining cohort of graduate students on an annual basis. There appears to be sufficient physical and staff resources for faculty hires to be successful in launching grant-funded research.

8. Evaluate credentials and involvement of **adjunct faculty and support personnel.**

Adjunct faculty and support personnel were not yet hired to the program at the time of review.

III. Students

9. Comment on the **student population the program seeks to serve**, and assess plans and projections for student recruitment and enrollment.

The ESE program will admit students to the major after 24 credits. The program has been designed carefully to take advantage of community college programs as pathways to admit students to the program. Such arrangements can be very effective strategies to populate an engineering program with students who will persist to graduation.

10. What are the prospects that recruitment efforts and admissions criteria will supply **a sufficient pool of highly qualified applicants and enrollees?**

Capitalizing on relationships with community college programs is an effective way to ensure a strong pool of students for the program. Additionally, the University and the College offer a number of support services to support the success of students who may not be fully prepared for university engineering courses. The proposed bridge programming for students in the summer preceding the start of their first year in engineering will help to identify gaps in fundamental mathematics and science preparation, impart strong study skills and build a strong network of community for students as they proceed through degree completion.

11. Comment on provisions for encouraging participation of **persons from underrepresented groups.** Is there adequate attention to the needs of part-time, minority, or disadvantaged students?

Details on how to implement a part-time study program were not discussed. Consideration of ‘early in the day’ or ‘late in the day’ scheduling of core and technical courses could be considered to accommodate students who have other commitments necessitating part-time study. The small size of the ESE cohort likely dictates once-per-year scheduling of classes which brings some challenge to part-time degree completion.

The evaluating team overlooked the topic of Advancement/Development during on-campus discussions. A plan for development to generate scholarship support should be considered.

12. Assess the system for monitoring students’ progress and performance and for advising students regarding academic and career matters.

The U. Albany has a robust program in place to support students in navigating academic and career progress. The assigned academic advisors in the central Undergraduate Advising office help students to have touch point if they apply to and then opt out of engineering. The College academic advisors that students begin to work with after transfer to an engineering major seem to be well-organized. In particular, the notes record of interactions with students allows students to have the responsibility for charting their own pathway through the curriculum and helps students to see their own responsibility for poor decisions or lacking follow-through.

Additional support for ESE students to navigate career matters may be necessary. The U. Albany Career Services has a large student responsibility. A case can be made for adding an additional counsellor to accommodate the full growth of the College of Engineering and Applied Sciences. Work-related experience is of high demand for future employers so there may be more need for career support in engineering programs than elsewhere at the University.

13. Discuss prospects for graduates’ post-completion success, whether employment, job advancement, future study, or other outcomes related to the program’s goals.

The proposed curriculum map, the inclusion of ‘real-world’ engineering problems in the senior capstone course, the program relationships with state agencies through atmospheric sciences and public health, and the proposed student support services should prepare students well for successful entry to the job market.

Earlier inclusion of CAD and GIS tools in the curriculum will open the door for students to pursue internships before they have completed their studies.

IV. Resources

14. Comment on the adequacy of physical resources and facilities, e.g., library, computer, and laboratory facilities; practica and internship sites or other experiential learning opportunities, such as co-ops or service learning; and support services for the program, including use of resources outside the institution.

There is a clearly detailed plan for renovating space for the ESE program. Dedicated space has been identified in the University Administrative Building for co-located departmental administrative activities and faculty offices. Dedicated research and teaching lab spaces for the ESE program are located in the Biology building. The plan to bring space on-line in sequence to hiring and teaching needs is a little tight. The completed renovations of the BI 317-318 suite look great and the progress on the additional faculty space in BI 355 look good. A back-up plan for accommodating teaching in the research space in the second year of the program, if necessary, is adequate. Plans to bring a shared instrumentation space on-line have some potential to slow down faculty access to instrumentation.

Care should be taken to provide remedies or assurances that slow progress in this area will not hinder faculty promotion reviews.

15. What is the **institution's commitment** to the program as demonstrated by the operating budget, faculty salaries, the number of faculty lines relative to student numbers and workload, and discussions about administrative support with faculty and administrators?

Discussions during the on-campus review detailed a clear plan to support the development of the ESE program through faculty salary support, institutional space allocations and staffing. Faculty lines are appropriate to student number projects and are consistent with workload requirements for research-active faculty.

Additional support in the area of career services will be beneficial to the ESE program and the expanding College of Engineering and Applied Sciences. Current staffing support for career services is about 1 counsellor per 2000 students. With a total of 2700 new engineering enrollments, at least one new career counsellor can be justified. Further, the competitive employability of graduating engineers depends on internship, or other relevant job market experience, so these students are anticipated to have higher demands of career services that students from some other programs on campus.

V. Summary Comments and Additional Observations

16. Summarize the **major strengths and weaknesses** of the program as proposed with particular attention to feasibility of implementation and appropriateness of objectives for the degree offered.

Overall, the Environmental and Sustainable Engineering program at U. Albany appears poised to be successful. The program has the unique opportunity to capitalize on institutional strengths in atmospheric sciences and public health that will allow it to distinguish itself from some other conventional environmental engineering programs. The University and the College seem committed to the success of the program through commitment of real space and budgetary resources. The only potential shortcoming is attentiveness to faculty mentoring as the faculty will be composed largely of individuals who are starting their scholarly careers at the same time that they will be participating in the build-out of a new academic department.

17. If applicable, particularly for graduate programs, comment on the ways that this program will make a **unique contribution** to the field, and its likelihood of achieving State, regional and/or national **prominence**.

The ESE program is positioned to have strong likelihood of impact in the regional Capital area.

18. Include any **further observations** important to the evaluation of this program proposal and provide any **recommendations** for the proposed program.



External Reviewer Conflict of Interest Statement

I am providing an external review of the application submitted to the State University of New York by:
University at Albany

(Name of Institution or Applicant)

The application is for (circle A or B below)

A) New Degree Authority

B) Registration of a new academic program by an existing institution of higher education:

Environmental and Sustainable Engineering

(Title of Proposed Program)

I affirm that I:

1. am not a present or former employee, student, member of the governing board, owner or shareholder of, or consultant to the institution that is seeking approval for the proposed program or the entity seeking approval for new degree authority, and that I did not consult on, or help to develop, the application;
2. am not a spouse, parent, child, or sibling of any of the individuals listed above;
3. am not seeking or being sought for employment or other relationship with the institution/entity submitting the application?
4. do not have now, nor have had in the past, a relationship with the institution/entity submitting the application that might compromise my objectivity.

Name of External Reviewer (please print):

Allison MacKay, Ph.D.

Signature:





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Institution: The University at Albany

Evaluator Name (Please print.): Ben J. Stuart

Evaluator Title and Institution: Senior Associate Dean and Professor of Civil and Environmental Engineering, Batten College of Engineering and Technology, Old Dominion University

Evaluator Signature: 

Proposed Program Title: Environmental and Sustainable Engineering

Degree: B.S.

Date of evaluation: February 20-21, 2018

I. Program

1. Assess the program's **purpose, structure, and requirements** as well as formal mechanisms for program **administration and evaluation**. Address the program's academic rigor and intellectual coherence.

The purpose (Program Educational Objectives – PEOs) of the proposed program is to prepare graduates to enter, contribute to, and advance in the environmental engineering profession. Student Learning Outcomes (SLOs) are presented that allow students to meet the PEOs. Both PEOs and SLOs are appropriate and consistent with ABET accreditation requirements; in fact, SLOs are adopted directly from the proposed changes to ABET's Criterion 3 that are currently under review and slated for adoption next year.

The structure and requirements are also appropriate for an ABET accredited program in this field. The 42 credits of math and basic sciences (M&BS) required by the program is in excess of the 30 M&BS credits required by ABET. The 38 core and 9 elective courses in engineering topics are in excess of the 45 required by ABET, and offers an appropriate distribution of engineering sciences as well as engineering design topics. The 20 remaining program credits are allocated to environmental sciences, environmental health sciences and

computer engineering, resulting in a total of 109 credits in the major. The remaining 19 credits in the program (128 required for the degree) are for general education requirements.

I do feel that there is an opportunity to provide additional clarity as to the program's ability to meet ABET accreditation criteria in the curriculum. Among the several skills and knowledge areas to be covered by the program, ABET Program Criteria for Environmental and Similarly Named Engineering Programs require that, "*The curriculum must prepare graduates to apply knowledge of... an earth science...*" The program should be prepared to identify how this is accomplished in the curriculum. Further, although I appreciate the SUNY requirements from a consistency point of view, it is unfortunate that some or all of the 12 M&BS credits in excess of the minimum could not be allocated; either to the "*earth science*" requirement identified above, or to required and/or elective engineering topics. Two semesters of biology and an additional two semesters of physics might not be in the best interest of the students in this program. This could also be said of the two required courses in computer engineering (i.e. one would be more than sufficient). The additional courses could also strengthen the unique aspects of the curriculum as described in the "special focus" response below. On the positive side, program access for transfer students receiving degrees on the Transfer Path from the community college system should provide well-trained students as well as offering a jump start to program enrollments.

Program administration did not appear to be a specific focus of the proposal that was offered for review. Dean Boyer and Chair Liang appear to have a clear and shared vision, but if you asked me about specific "formal mechanisms", I may or may not be able to articulate what those are. The site visit provided an opportunity to meet with numerous college and university officials that made it clear that there is a groundswell of support for the program. I am confident that any guidance required would be readily available in support of this new program within a relatively new college. That said, I see a significant amount of work ahead in defining policies and procedures for administrative duties for the department that are consistent with existing college and university P&P.

Formal mechanisms for program evaluation are much better articulated and understood. I have no reservations that the program is aware of the SUNY and ABET accreditation P&P and have developed an initial plan to conduct assessment and continuous improvement. My one recommendation (that I shared with the Dean and Chair during my visit) is that it is extremely useful for each engineering program to have at least one faculty member that has formal Program Evaluator Volunteer (PEV) training through ABET. An active ABET PEV in the department is able to maintain currency with ABET P&P as well as criteria evolution, and they often make excellent Assessment Coordinators to manage the process for the department.

As to the issue of academic rigor and intellectual coherence, the program curriculum is complete and consistent with a program in environmental engineering that seeks to attain the PLOs and SLOs defined in the proposal and will eventually seek ABET accreditation.

2. Comment on the **special focus** of this program, if any, as it relates to the discipline.

The strength of the proposed program lies in the connection with existing, strong programs in Atmospheric and Environmental Sciences and the School of Public Health. Often, environmental engineering programs are slightly modified versions of civil engineering and as such lack connection to the non-engineering community. The required core and available electives in Environmental Sciences and Environmental Health Sciences broadens students' perspectives and will allow the program to more readily meet ABET Program Criteria which require graduates to "*design environmental engineering systems that include considerations of risk, uncertainty, sustainability, life-cycle principles, and environmental impacts*" as well as "*understand concepts of... roles and responsibilities of public institutions and private organizations pertaining to environmental policy and regulations.*"

3. Comment on the plans and expectations for **self-assessment and continuous improvement**.

As mentioned previously, ABET accreditation criteria were a significant driver informing the development of the PLOs, SLOs and program curriculum. A significant focus of ABET accreditation is the definition of a continuous improvement process, regular collection of SLO data that feeds the CI process, and discrete improvements in the program based on this information. Performance Criteria and Indicators were included in the proposal along with the courses/course activities that will be subjected to evaluation. While specific performance benchmarks or evaluation rubrics were not available for my review, I feel the Chair and faculty have ample time to develop these as the courses to be used in the assessment of SLOs are brought online.

4. Discuss **the relationship** of this program to other programs of the institution and collaboration with other institutions, and assess available support from related programs.

As mentioned above, the strength of the proposed program lies in the connection to existing programs at the university in Atmospheric and Environmental Sciences and the School of Public Health, and support is provided in the way of core and elective course offerings and research/experiential learning opportunities. Although not a requirement for the success of the B.S. program proposed, this also bodes well for faculty with research strengths in these areas that will have ready colleagues and facilities for scholarly activity. I feel the strongest tie to other institutions are the feeder programs associated with the Transfer Path. I also feel that connectivity with other planned programs (e.g. Bioengineering) are an exciting possibility in the future.

5. What is the evidence of **need** and **demand** for the program locally, in the State, and in the field at large? What is the extent of occupational demand for graduates? What is the evidence that demand will continue?

In my 23 years as an environmental engineering professional, accredited programs at the BS level have increased from four to over 70. NCEES has included environmental engineering as one of only six discipline-specific topical areas for the Fundamentals of Engineering exam. As environmental awareness and desire for protection and remediation has increased over the past three decades, there has been a steadily increasing need at the national level for B.S. environmental engineers. With the emphasis on sustainable practices in manufacturing, transportation, construction, etc. only becoming more widespread, the trend should be expected to continue – if not accelerate.

The data provided in the proposal clearly indicate that the State of New York estimates an increase in the number of environmental/health and safety engineers needed to meet employment demands over the next decade. Given the annual average projection of 200-250 openings in environmental/health and safety engineering and the current enrollments in similar programs in the region/state, it appears that some 60-110 additional graduates could be absorbed by the employers on an annual basis. [Note that the estimated number of current annual graduates (142) was obtained by summing the current enrollments in similar programs and dividing by four (the assumed time to graduation in each of those programs). Also note that Clarkson University data was not available in this estimate.]

II. Faculty

6. **Evaluate the faculty**, individually and collectively, with regard to training, experience, research and publication, professional service, and recognition in the field.

I am unable to provide a complete response as the only current member of the faculty is the Chair (as many as four new faculty are expected next Fall). It should be noted that Dr. Liang is an accomplished member of the faculty and is very well respected in the engineering community.

7. **Assess the faculty in terms of number and qualifications and plans for future staffing.** Evaluate **faculty responsibilities** for the proposed program, taking into account their other institutional and programmatic commitments. Evaluate faculty **activity in generating funds** for research, training, facilities, equipment, etc. Discuss any **critical gaps and plans for addressing them.**

The curriculum indicates that 15 courses will be required to be taught by program faculty; 12 of which should be yearly offerings and the three electives may be offered every-other year. With a conventional 2/2 teaching load, at steady state these courses could be easily managed with a Chair and three additional faculty. However, as additional electives are developed, and considering the more appropriate 1/2 or even 1/1 teaching load granted to probationary faculty with an expectation for an active research program, the minimum number of faculty increases to six (plus the Chair). As graduate programs come online, the additional course load increases and the required number of faculty will need to be reassessed.

I suggest a two pronged approach to securing adequate teaching faculty; adjuncts and a Lecturer. I would seek adjuncts that could teach statics, strength of materials, and possibly fluid mechanics to cover these courses for the next 2-3 years. I would also begin the process of seeking approval for a Lecturer line for the next academic year. A Lecturer would provide half of your teaching load (typically a 3/3 load) and allow the remaining four probationary faculty to carry the 1/1 load and establish their research programs. Once the probationary faculty are tenured, the additional teaching load they can take on would be allocated to teaching the graduate courses required for the advanced degree program(s).

As for support staff, a single administrative assistant is sufficient for a single undergraduate program, however additional staff may be required to support a graduate program and research active faculty. I understand that the college and/or university can provide some of this support, but it is often advantageous to have these capabilities in the department. Further, as program course offerings and research activity increase, it may be appropriate to hire a technician to manage student and research laboratory facilities.

8. Evaluate credentials and involvement of **adjunct faculty** and **support personnel.**

I am unable to provide a response as no adjunct faculty were proposed or presented for review. The presentation by Dean Boyer suggests that a staff member (secretary) was hired, but I do not have the information required to evaluate their credentials or involvement.

III. Students

9. Comment on the **student population the program seeks to serve**, and assess plans and projections for student recruitment and enrollment.

The program seeks to serve students desiring to make an active change in the quality of the environment and lessen the negative impact that may be a result of human activities. Whereas previous generations of environmental engineers might have been seen as particularly sensitive to the cause of protecting and restoring ecosystems when compared to their peers, the current generation of high school graduates have a nearly universal understanding and awareness. That population is ready to engage and this program will allow those who would be engineers someday a venue to express that desire.

Student enrollment projections are extremely difficult to make. Given the fact that the college is new, the field is attractive to a diverse student body and there is a documented need for engineers with these skills in the State, I think the enrollments stated in the proposal may be conservative (i.e. I would not be surprised if enrollments grew at a much faster rate) – and there is no reason not to expect student enrollments at steady

state in the 150 FTE range (similar to SUNY College of ESF and the University at Buffalo). I agree that recruitment will greatly impact the actual numbers, and discussions with the college Dean and program Chair demonstrate that they are aware of this. It would be appropriate to include a more defined plan in the final proposal that addresses the means by which students in the Capitol region and community college system would become aware of the new program. I also was not made aware of the college/department outreach plans and suggest consideration be given to a full-time hire to manage these activities for the college.

10. What are the prospects that recruitment efforts and admissions criteria will supply a sufficient pool of highly qualified applicants and enrollees?

Recruitment was addressed in the previous response; a detailed plan would be appropriate and appreciated by those charged with recruitment efforts. Admissions criteria are not unique to this program and students are not restricted from entering the program after the completion of 24 credits. Typically, it is the students' aptitude in mathematics that often dictates the rate of progression in engineering programs. If appropriate (allowable?), CEAS may want to consider a universal designation for pre-engineering or engineering-intended students that assure their success in the M&BS courses (e.g. by providing targeted tutoring efforts) prior to entry in a specific program in the college, thus increasing the probability for success within the major.

11. Comment on provisions for encouraging participation of persons from underrepresented groups. Is there adequate attention to the needs of part-time, minority, or disadvantaged students?

One of the fantastic truths about environmental engineering is that the students are equally represented (50%) by both female and male students; a significant increase over the more traditional engineering disciplines (5-20% women). Further, these female students require no additional services that are not already provided to college students; in contrast, many of these women are among the most self-motivated, self-directed and successful students in their programs. The only concern might arise from a mentoring perspective in that the faculty should be representative of the student population. Consideration should therefore be given (as was discussed in the proposal) in the recruitment and hiring of a program faculty reflective of the potential student body (a woman Chair is an excellent start).

As the University is designated as an MSI, this program also offers a tremendous opportunity to attract minority students that are typically underrepresented in the engineering disciplines. The proposal addresses this and has described plans for outreach to K-12 students for recruitment and for engagement activities (e.g. SWE, NSBE, AEESP) for students in the program to improve retention. With respect to disadvantaged students, this is an institution-level issue – there is nothing unique to this program that would suggest a need for distinct or additional services. With respect to nontraditional students, it would be appropriate for the program to provide course scheduling options that consider the prerequisite sequence and once-per-year offerings of core courses for students regularly taking less than 16 credits per semester or students transferring in course credits that place them off the schedule typical of matriculated students in the program, as well as consideration of the possibility for students to take core or program elective summer classes.

12. Assess the system for monitoring students' progress and performance and for advising students regarding academic and career matters.

I am comfortable with the systems in place at the University for monitoring student progress and academic advising. Career advising requires two simultaneous approaches; career mentoring and career services. University systems are in place for providing career services; faculty will be expected to provide appropriate mentoring. The department administration will need to provide a process by which faculty are trained as mentors, student mentoring is monitored, as well as a process by which any student concerns are addressed.

13. Discuss prospects for graduates' post-completion success, whether **employment, job advancement, future study, or other outcomes related to the program's goals.**

There is no reason to believe that there would be any restriction on graduates of the proposed program to obtain immediate employment in industry, consulting, or the public sector, or for graduates to be able to pursue advanced studies at any other institution of higher learning.

IV. Resources

14. Comment on the adequacy of physical **resources and facilities**, e.g., library, computer, and laboratory facilities; practica and internship sites or other experiential learning opportunities, such as co-ops or service learning; and support services for the program, including use of resources outside the institution.

The library provided a detailed list of resources currently available and a budget for acquisition of those required by the program that are not currently available. This included both print and on-line resources. Computer facilities were appropriate for general purpose, however little was mentioned about computing resources (i.e. software) specific to the discipline (e.g. hydraulic modeling CAD packages). It would be of value to develop a list of the computing and software resources required for the curriculum and assess if those resources should be made available in a specific computer laboratory, or across the campus (may be cost prohibitive for unlimited licenses versus a specific number of seat licenses). Further, students often complete a majority of their work on personal computers (laptops) and efforts should be made to identify software that is available for use as student versions on personal (as opposed to institutional) machines.

Laboratory facilities were under renovation at the time of the campus visit and would appear to be adequate for the first several years of program enrollments. Should enrollments grow beyond the current predictions, additional laboratory space would most likely need to be developed. [Note that this does not include the laboratories that are being developed for faculty research.] Internships are a large part of engineering education, and there will be the need for a significant effort to develop these relationships. It would be most advantageous to develop the Industrial Advisory Board as soon as possible and populate this resource with senior personnel from those companies, firms and agencies that are most likely to offer employment both during (summers) and after the completion of the program. These external partners can also play an invaluable role in the planning and execution of capstone design experiences that provide students with unparalleled experiences and preparation just prior to entering the professional community.

15. What is the **institution's commitment** to the program as demonstrated by the operating budget, faculty salaries, the number of faculty lines relative to student numbers and workload, and discussions about administrative support with faculty and administrators?

Given Dean Boyer's confidence and assurances, I have every reason to believe that the University is committed to providing the resources necessary to stand-up this new program at the level described in the proposal. Future investments will clearly be dependent upon the rate and level of success. Based upon the reported salary expenses and capital expenses, the program should have sufficient personnel and equipment to embark upon a journey of discovery and development. Ongoing operational expenses beyond the personnel line are not as well defined, and as a former Chair, I am painfully aware that previously unidentified needs will always arise. Without a detailed budget, it is impossible to know if operations are adequately funded. In as much, I strongly urge Dr. Liang to spend time with the Chair of Electrical and Computer Engineering to get a sense of expenses incurred in all of the sub-object codes and from where the under-resourced needs arise and how budget shortfalls are met (easier for research active departments than those offering just the B.S.).

V. Summary Comments and Additional Observations

16. Summarize the **major strengths and weaknesses** of the program as proposed with particular attention to feasibility of implementation and appropriateness of objectives for the degree offered.

The development of an environmental engineering program that possesses a core in environmental health sciences and a dedication to sustainable engineering practices is a very attractive proposition (in contrast to a traditional program birthed out of civil engineering). The relationship with an existing strong program in Atmospheric and Environmental Sciences and the School of Public Health offers additional unique qualities. The program benefits from a strong attraction from female engineering students and significantly increases the diversity of the engineering profession. ABET assessment and accreditation practices require the program to be rigorously monitored and strive for continuous improvement. The proposed program appears to be strongly supported and resourced by the upper administration and the Dean of the college.

I do not perceive any major weaknesses in the program. Previous comments have suggested some opportunities for additional clarity or definition of select policies and/or procedures.

17. If applicable, particularly for graduate programs, comment on the ways that this program will make a **unique contribution** to the field, and its likelihood of achieving State, regional and/or national **prominence**.

If successful, the program will provide highly competent practicing engineers in fields of high demand as identified by the State of New York's Department of Labor. The program has every potential to be widely respected in the State and region, however national prominence will depend more on the success of faculty's research programs than upon the quality of the undergraduate students produced.

18. Include any **further observations** important to the evaluation of this program proposal and provide any **recommendations** for the proposed program.

No observations or recommendations not previously stated.



The State University
of New York

External Reviewer Conflict of Interest Statement

I am providing an external review of the application submitted to the State University of New York by:

University at Albany

(Name of Institution or Applicant)

The application is for (circle A **or** B below)

A) New Degree Authority

B) Registration of a new academic program by an existing institution of higher education:

Environmental and Sustainable Engineering

(Title of Proposed Program)

I affirm that I:

1. am not a present or former employee, student, member of the governing board, owner or shareholder of, or consultant to the institution that is seeking approval for the proposed program or the entity seeking approval for new degree authority, and that I did not consult on, or help to develop, the application;
2. am not a spouse, parent, child, or sibling of any of the individuals listed above;
3. am not seeking or being sought for employment or other relationship with the institution/entity submitting the application?
4. do not have now, nor have had in the past, a relationship with the institution/entity submitting the application that might compromise my objectivity.

Name of External Reviewer (please print):

Ben J. Stuart

Signature:

INSTITUTIONAL RESPONSE TO ENVIRONMENTAL AND SUSTAINABLE ENGINEERING PROGRAM REVIEW

DATED: March 19, 2018

The Department of Environmental and Sustainable Engineering (ESE) and the College of Engineering and Applied Sciences (CEAS) have reviewed the External Evaluation Reports carefully. These two reports were written by two professionals who are experts in the Environmental Engineering discipline and seasoned ABET (Accreditation Board for Engineering and Technology) accreditors. Both reviewers have expressed their strong confidence in the ESE program which they believe appears poised to be successful. In light of the newness and uniqueness of the ESE program at University at Albany (UAlbany), they provided substantive comments and recommendations. This Institutional Response responds to each comment and recommendation made by each reviewer.

REVIEWER: Allison MacKay

Comment (Q1): If state requirements of basic engineering preparation are revisited, Mechanics of Materials could be removed from the curriculum as it is not critical to environmental engineering practice. Similarly, a reexamination of the pre-requisite requirements of Probability and Statistics could remove Discrete Structures from the environmental engineering course requirements.

Response: We completely agree with this comment. The Mechanics of Materials was initially included in the ESE curriculum since it is required by SUNY's seamless transfer pathway. But for ESE undergraduate students, this course does not contribute materially to the body of knowledge needed for the practice of Environmental Engineering. In addition, no upper level courses require knowledge or skills from this course or designate this course as a prerequisite or corequisite. Considering these reasons, we believe that replacing this course with one that specifically targets Environmental Engineering will greatly benefit our students and we are requesting a Seamless Transfer waiver for this course.

A MAT 370 Probability and Statistics for Engineering and the Sciences is a required course for ESE students. This course has a prerequisite of A MAT 367, Discrete Probability or I CEN/I CSI 210, Discrete Structures. Since ICEN 210 is an engineering course and can be counted toward the engineering topics required by ABET, we would prefer to have this course as a prerequisite. However, we will reexamine it later and determine whether it is a good fit as a prerequisite for A MAT 370.

Comment (Q1): It is important that the Vice Provost for Research assign sufficient sponsored research support for ESE and other College faculty as this will be a grant intensive department.

Response: We recognize the need of the new faculty in the ESE program and agree with this comment. As of now, all offers we give to the four new hires include a start-up package. The new hires can use this fungible start-up fund to purchase equipment and lab supplies, support undergraduate and graduate students for research, and attend conferences. The dollar amounts of the start-up packages are different for different faculty members and are set to jump-start their research here.

Comment (Q6): Given the commitment necessary to mentor new assistant professors to success, the program should consider inclusion of mid-career hires in the next round of hiring. Attention must be paid to balancing program needs for new course preparations against the time commitment for early career faculty to establish their programs of scholarship.

Response: We certainly agree with this suggestion. As a matter of fact, hiring a mid-career faculty is in our plan for the next round of hiring between Fall of 2018 and Spring of 2019. We also recognize the need for junior faculty to have sufficient time to start their career here. For this consideration, we only give two courses per year for each new hire for the first two years. Later years, we will strive to assign reasonable teaching loads to each faculty member to encourage their research and scholarly activities.

Comment (Q11): Details on how to implement a part-time study program were not discussed. Consideration of 'early in the day' or 'late in the day' scheduling of core and technical courses could be considered to accommodate students who have other commitments necessitating part-time study. The small size of the ESE cohort likely dictates once-per-year scheduling of classes which brings some challenge to part-time degree completion.

Response: We agree that it could be difficult to offer courses outside of the regular class hours considering the small size of ESE faculty and students. However, if we have a reasonable number of part-time students, we will try our best to satisfy their need. For example, we may consider offering on-line courses or having courses offered in the early or late of a day. If our ESE faculty cannot handle this extra load, we may seek to hire adjuncts or lecturers if budget allows.

Comment (Q11): The evaluating team overlooked the topic of Advancement/Development during on-campus discussions. A plan for development to generate scholarship support should be considered.

Response: The University is committed to mentoring its junior faculty. (<http://www.albany.edu/academics/mentoring.best.practices.toc.shtml>). The Department Chair and College Dean work closely with faculty throughout the first few years of the program to determine the appropriate balance among the three categories of scholarship, teaching and service upon which new faculty will be evaluated. The University at Albany's "Procedures for Promotion and Tenure Review" (http://www.albany.edu/academics/promotion_tenure/introduction.shtml) indicate that recommendations for promotion and tenure shall be based primarily upon a careful deliberation concerning the effectiveness of the candidate within each of the three categories of scholarship, teaching and service "as appropriate to the position of the candidate within the University." This allows the Department Chair and College Dean to recognize that as we establish the new program, the position of new faculty may focus more heavily on their curricular and service contributions than is normally expected, while recognizing that faculty will still be expected to have a trajectory that would be appropriate for a STEM department at a research university. Thus, it is expected that (1) candidates will receive appropriate mentoring during their pre-tenure years and (2) the Department Chair and College Dean will provide appropriate background material to the university-level promotion and tenure committee (University Senate Council on Promotion and Continuing Appointment) to ensure that candidates will be appropriately evaluated through the tenure and promotion process.

Comment (Q12): Additional support for ESE students to navigate career matters may be necessary. The U. Albany Career Services has a large student responsibility. A case can be made for adding an additional counsellor to accommodate the full growth of the College of Engineering and Applied Sciences. Work-related experience is of high demand for future employers so there may be more need for career support in engineering programs than elsewhere at the University.

Response: We do recognize the limited staff at the Office of Career and Professional Development. To supplement what may be lacking for the College of Engineering and Applied Sciences (CEAS) considering its unique features, an Associate Dean for Applied Learning is currently in place. This Associate Dean will

be responsible for connecting the college with industries and government agencies within the capital region, helping students identify internship opportunities and assisting departments within CEAS in finding Capstone design projects that aim to solve real-world problems. If having this person is still not enough to help students navigate career matters, we may add one staff member at the Office of Career and Professional Development who specializes in guiding engineering students or having one person in CEAS who is dedicated to providing this type of service.

Comment (Q13) Earlier inclusion of CAD and GIS tools in the curriculum will open the door for students to pursue internships before they have completed their studies.

Response: Due to the small size of the ESE faculty, we will not be able to offer courses on CAD and GIS within the department. However, students can take these two courses: A USP 452 CADD in Planning and A GOG 496 (= A USP 456) Geographic Information Systems offered by the Department of Geography and Planning. The first one is an on-line course offered by Bentley MicroStation. This course applies the concepts and theories underlying Computer Aided Design and Drafting (CADD) to site planning, urban design, and land-use mapping, including 2D concept diagrams, site plan detail and 3D perspectives. It also reviews rendering, 4D applications, visualization, and CADD management. There are no prerequisites for this course. The second one gives introduction to the structure, design, and application of database management systems designed to accept large volumes of spatial data derived from various sources. The students will learn how to efficiently store, retrieve, manipulate, analyze, and display these data according to a variety of user-defined specifications. The prerequisites are familiarity with maps and coordinate systems. This course is offered every fall and spring, and is sometimes (often) offered in summer as well. Thus, for ESE students who are interested in learning about CAD and GIS, these two courses are sufficient.

Comment (Q14): The plan to bring space on-line in sequence to hiring and teaching needs is a little tight. The completed renovations of the BI 317-318 suite look great and the progress on the additional faculty space in BI 355 look good. A back-up plan for accommodating teaching in the research space in the second year of the program, if necessary, is adequate. Plans to bring a shared instrumentation space on-line have some potential to slow down faculty access to instrumentation. Care should be taken to provide remedies or assurances that slow progress in this area will not hinder faculty promotion reviews.

Response: The University fully recognizes the need of wet labs for most ESE faculty. Wet lab space for four ESE professors has been identified and renovation is underway. Besides lab space for faculty, office space for graduate students and wet lab for teaching have also been located. It is beneficial for the ESE program that all labs are located on the same third floor of the Biology building. The core facility in the basement of BI 24-25 won't be ready until fall of 2019. However, major instrumentation purchased by each faculty member can be housed in their lab first. Once the core lab is ready for use, the facilities will help move these equipment to the core lab with no charge. Thus, the late readiness of the core facility will not affect or slow down faculty access to instrumentation and should not be a factor impacting their progress toward tenure and promotion. However, if for some unexpected reasons, moving major equipment from the faculty's lab to the core facility causes some negative impact on the faculty's research, we will consider that when we conduct faculty promotion reviews.

Comment (Q15): Additional support in the area of career services will be beneficial to the ESE program and the expanding College of Engineering and Applied Sciences.

Response: We do recognize the limited staff at the Office of Career and Professional Development. To supplement what may be lacking for the College of Engineering and Applied Sciences (CEAS) considering its unique features, an Associate Dean for Applied Learning is currently in place. This Associate Dean will be responsible for connecting the college with industries and government agencies within the capital region, helping students identify internship opportunities and assisting departments within CEAS in finding Capstone design projects that aim to solve real-world problems. If having this person is still not enough to help students navigate career matters, we may add one staff member at the Office of Career and Professional Development who specializes in guiding engineering students or having one person in CEAS who is dedicated to providing this type of service.

Comment (Q16): The only potential shortcoming is attentiveness to faculty mentoring as the faculty will be composed largely of individuals who are starting their scholarly careers at the same time that they will be participating in the build-out of a new academic department.

Response: Besides the ESE chair, we will hire a mid-career faculty member in the hiring season of Fall 2018 and Spring 2019. At least the Chair and this new hire will be able to mentor the junior faculty in the ESE program. In addition to mentoring strategy provided in Response to Comment (Q11), the Vice President for Research's (VPR) office offers Coffee hour every Thursday for faculty to interact with each other. In addition, the VPR's office offers workshops to junior faculty on how to write grant proposals and how to start their research here. With all of these in and out of department assistance, newly renovated labs and reasonable start-up packages, the newly hired junior faculty should be able to establish themselves very soon.

Response to Ben Stuart's comments and suggestions

Comment (Q1): I do feel that there is an opportunity to provide additional clarity as to the program's ability to meet ABET accreditation criteria in the curriculum. Among the several skills and knowledge areas to be covered by the program, ABET Program Criteria for Environmental and Similarly Named Engineering Programs require that, "The curriculum must prepare graduates to apply knowledge of... an earth science..." The program should be prepared to identify how this is accomplished in the curriculum. Further, although I appreciate the SUNY requirements from a consistency point of view, it is unfortunate that some or all of the 12 M&BS credits in excess of the minimum could not be allocated; either to the "earth science" requirement identified above, or to required and/or elective engineering topics. Two semesters of biology and an additional two semesters of physics might not be in the best interest of the students in this program. This could also be said of the two required courses in computer engineering (i.e. one would be more than sufficient).

Response: The program proposal did consider ABET requirement but was not intended for ABET evaluation. So, the component of Earth Science was not clearly labeled. Earth science has four basic areas: Geology, Meteorology, Oceanography and Astronomy. In the ESE curriculum, Geology is covered by one required course: *A ENV 250 Sustainable Development: Energy and Resources* and two electives: *A GEO 350 Environmental Geochemistry* and *A GOG 496 (= A USP 456) Geographic Information Systems*. Regarding Meteorology, it is covered well by one required course: *A ATM 210/210Z Atmospheric Structure, Thermodynamics, and Circulation* and three electives: *A ATM 304/304Z Air Quality and Air Pollution Policy*; *A ATM 307/307Z (= A CHM 307/307Z) Introduction to Atmospheric Chemistry*; and *A ATM 301 Surface Hydrology and Hydrometeorology*.

Comment (Q1): Program administration did not appear to be a specific focus of the proposal that was offered for review. Dean Boyer and Chair Liang appear to have a clear and shared vision, but if you asked me about specific “formal mechanisms”, I may or may not be able to articulate what those are. The site visit provided an opportunity to meet with numerous college and university officials that made it clear that there is a groundswell of support for the program. I am confident that any guidance required would be readily available in support of this new program within a relatively new college. That said, I see a significant amount of work ahead in defining policies and procedures for administrative duties for the department that are consistent with existing college and university P&P.

Response: We agree with this comment. The CEAS is relatively new and a significant number of policies and procedures are under development. Specific to the ESE department, once the faculty is in place, we will develop needed policies and procedures in line with those available at the CEAS and the university.

Comment (Q1): My one recommendation (that I shared with the Dean and Chair during my visit) is that it is extremely useful for each engineering program to have at least one faculty member that has formal Program Evaluator Volunteer (PEV) training through ABET. An active ABET PEV in the department is able to maintain currency with ABET P&P as well as criteria evolution, and they often make excellent Assessment Coordinators to manage the process for the department.

Response: We concur with this comment. Having at least one faculty member who has formal training on ABET accreditation in each development is one of CEAS’s plans. Specific to ESE, the Chair, Dr. Liang is an ABET IDEAL (Institute for the Development of Excellence in Assessment Leadership) Scholar. She is well versed on ABET program requirements, evaluation, assessment, continuous improvement and accreditation. Dr. Liang is also planning to be a ABET Program Evaluator Volunteer (PEV).

Comment (Q6): I am unable to provide a complete response as the only current member of the faculty is the Chair (as many as four new faculty are expected next Fall).

Response: We are in the process of hiring four new faculty members. They will all start in Fall of 2018. Currently, two official offers have been accepted while the other two candidates have accepted the formal Letter of Intent. The official offer letter from the Provost’s office for the third hire was sent out last week and the letter for the fourth one is in the pipeline. Selected from an extremely strong pool of applicants, all new hires have been trained in the field of Environmental Engineering. They all have teaching and postdoctoral research experience varying between 2 and 10 years in this field. Most of them have grant writing experience and half of them have secured grants successfully. In addition, each faculty member brings in a strong record on research publication and services in professional societies.

Comment (Q7): As graduate programs come online, the additional course load increases and the required number of faculty will need to be reassessed.

Response: We certainly agree with this suggestion. For the purpose of encouraging and stimulating research among junior faculty, we are implementing a 1+1 teaching load for each new assistant professor during the first two years. As we start the graduate program soon after the bachelor’s is launched, more courses will need to be offered. To meet this need, we will hire more faculty in specific areas. The faculty size is expected to be 10-15 in five years so that a fully featured ESE program can be established successfully.

Comment (Q7): I suggest a two pronged approach to securing adequate teaching faculty; adjuncts and a Lecturer. I would seek adjuncts that could teach statics, strength of materials, and possibly fluid mechanics to cover these courses for the next 2-3 years. I would also begin the process of seeking approval for a Lecturer line for the next academic year. A Lecturer would provide half of your teaching load (typically a 3/3 load) and allow the remaining four probationary faculty to carry the 1/1 load and establish their research programs. Once the probationary faculty are tenured, the additional teaching load they can take on would be allocated to teaching the graduate courses required for the advanced degree program(s).

Response: We certainly appreciate this suggestion and see the benefit of having adjuncts and lecturers teaching lower level ESE courses. However, we believe that by having a reasonable faculty size, our own ESE faculty can deliver all needed ESE courses. In addition, by having ESE faculty teaching Statics and Fluid Mechanics, undergraduate students can have earlier interactions with ESE professors. They will know and feel connected with the ESE program better. Furthermore, through teaching these fundamental engineering courses, the ESE faculty can better position themselves when they teach upper level courses, which will in turn benefit our students.

Comment (Q7): As for support staff, a single administrative assistant is sufficient for a single undergraduate program, however additional staff may be required to support a graduate program and research active faculty. I understand that the college and/or university can provide some of this support, but it is often advantageous to have these capabilities in the department. Further, as program course offerings and research activity increase, it may be appropriate to hire a technician to manage student and research laboratory facilities.

Response: All of these suggestions are good. Currently, we have one secretary assisting the ESE chair. Once the ESE BS program is officially approved, we will hire an administrative manager who will help program development. In addition, we may hire an academic advisor in addition to the two who are currently advising all students in CEAS. Once the core facility is ready, we will hire a technician to maintain the proper use of all equipment in the facility.

Comment (Q9): I agree that recruitment will greatly impact the actual numbers, and discussions with the college Dean and program Chair demonstrate that they are aware of this. It would be appropriate to include a more defined plan in the final proposal that addresses the means by which students in the Capitol region and community college system would become aware of the new program. I also was not made aware of the college/department outreach plans and suggest consideration be given to a full-time hire to manage these activities for the college.

Response: At this stage, since the ESE program is not officially approved, we are not allowed to advertise this program publically. But, once it is formally approved, the ESE program faculty will work closely with related offices on campus to make this program known to all relevant parties. For example, we will actively participate in open house and transfer day to introduce the ESE department to high school students and their families. We will also participate in outreach activities targeting high school students in the capital region. Additionally, working with the STEP and CSTEP programs, the ESE faculty will host high school and undergraduate students for conducting research in their labs.

Comment (Q10): If appropriate (allowable?), CEAS may want to consider a universal designation for pre-engineering or engineering-intended students that assure their success in the M&BS courses (e.g. by

providing targeted tutoring efforts) prior to entry in a specific program in the college, thus increasing the probability for success within the major.

Response: We are considering a universal pre-engineering program. Any intended engineering students will need to pass several introductory engineering courses. After they pass these courses with a grade of B or above for each, they can progress to a specific engineering discipline. By doing so, students will have a high success rate in a chosen major. We are planning to have this program ready once the Electrical and Computer Engineering program and the ESE program are fully launched.

Comment (Q11): The only concern might arise from a mentoring perspective in that the faculty should be representative of the student population. Consideration should therefore be given (as was discussed in the proposal) in the recruitment and hiring of a program faculty reflective of the potential student body (a woman Chair is an excellent start).

Response: We appreciate this observation and we realize the importance of having a program faculty that is diverse enough to reflect the diversity of the student body. In the current faculty search, we rank candidates based on their academic accomplishments while keeping diversity in mind. As a result, we may have an ESE faculty that is as diverse as possible. In future faculty search, we will adopt a similar strategy to fill the positions by highly accomplished professionals from a diverse pool. In return, it is expected that a diverse faculty will attract students from a diverse background.

Comment (Q11): With respect to nontraditional students, it would be appropriate for the program to provide course scheduling options that consider the prerequisite sequence and once-per-year offerings of core courses for students regularly taking less than 16 credits per semester or students transferring in course credits that place them off the schedule typical of matriculated students in the program, as well as consideration of the possibility for students to take core or program elective summer classes.

Response: We agree that it could be difficult to offer courses outside of the regular class hours considering the small size of ESE faculty and students. However, if we have a reasonable number of part-time students, we will try our best to satisfy their need. For example, we may consider offering on-line courses or having courses offered in the early or late of a day. If our ESE faculty cannot handle this extra load, we may seek to hire adjuncts or lecturers if budget allows. Similarly, during summer sessions, if enough students enroll in certain courses, we will offer them in the summer.

Comment (Q12): The department administration will need to provide a process by which faculty are trained as mentors, student mentoring is monitored, as well as a process by which any student concerns are addressed.

Response: Although all new hires have experience in mentoring students at different levels, from undergraduates to Ph.D. students, the ESE department will provide training to junior faculty so that they can be effective mentors. The ESE faculty will also be encouraged to participate in training sessions provided by the university and professional societies. In addition, the ESE chair will hold monthly meetings with faculty and student organizations in the ESE department and have an open-door policy. By doing so, any student concerns can be addressed in a timely manner.

Comment (Q14): Computer facilities were appropriate for general purpose, however little was mentioned about computing resources (i.e. software) specific to the discipline (e.g. hydraulic modeling CAD packages). It would be of value to develop a list of the computing and software resources required

for the curriculum and assess if those resources should be made available in a specific computer laboratory, or across the campus (may be cost prohibitive for unlimited licenses versus a specific number of seat licenses). Further, students often complete a majority of their work on personal computers (laptops) and efforts should be made to identify software that is available for use as student versions on personal (as opposed to institutional) machines.

Response: Regarding computing resources, the university has a list of licensed software that is available for faculty and students to download.

<https://wiki.albany.edu/display/public/askit/ITS+Software+Catalog>. These software includes Matlab and SAS. The hydraulic modeling CAD packages will be provided through a course: *A USP 452 CADD in Planning*. This course will be offered on-line by Bentley MicroStation. The university has 10 seats. In terms of software for students' laptop, all UAlbany students are entitled to a subscription license for Office 365 ProPlus at no charge.

Comment (Q14): Laboratory facilities were under renovation at the time of the campus visit and would appear to be adequate for the first several years of program enrollments. Should enrollments grow beyond the current predictions, additional laboratory space would most likely need to be developed. [Note that this does not include the laboratories that are being developed for faculty research.]

Response: As student enrollment grows, we will re-evaluate the need of teaching labs. Depending on the available resources, we would either add more labs or offer more lab sessions. No matter what approach we will take, we will ensure that each lab session accommodates 12-15 students so that each student can have opportunities to engage in hands-on experiments.

Comment (Q14): Internships are a large part of engineering education, and there will be the need for a significant effort to develop these relationships. It would be most advantageous to develop the Industrial Advisory Board as soon as possible and populate this resource with senior personnel from those companies, firms and agencies that are most likely to offer employment both during (summers) and after the completion of the program. These external partners can also play an invaluable role in the planning and execution of capstone design experiences that provide students with unparalleled experiences and preparation just prior to entering the professional community.

Response: We completely agree with this suggestion. At present, we are in the process of forming the Industrial Advisory Board from professionals in the capital region. We will have no problems of having this board established as soon as possible considering the broad presence of environmental engineering firms and regulatory agencies, such as Department of Environmental Conservation and Department of Health. We also have an Associate Dean for Applied Learning in CEAS who will connect the ESE program with the local industries. This Associate Dean will help us find real-world projects for senior capstone design projects and arrange summer internship opportunities for ESE students besides what can be provided by the career service office.

Comment (Q15): Ongoing operational expenses beyond the personnel line are not as well defined, and as a former Chair, I am painfully aware that previously unidentified needs will always arise. Without a detailed budget, it is impossible to know if operations are adequately funded. In as much, I strongly urge Dr. Liang to spend time with the Chair of Electrical and Computer Engineering to get a sense of expenses incurred in all of the sub-object codes and from where the under-resourced needs arise and how budget shortfalls are met (easier for research active departments than those offering just the B.S.).

Response: Besides personnel lines for faculty and staff, the ESE budget covers search expenses, department set-up costs, equipment for teaching labs and furniture/computer for the ESE department office. Specific to this ESE program, capital expenses for preparing research and teaching labs are in place. All these budgets cover a total of five years starting from 2017. Budget for teaching assistants (TAs) is not available at this stage and it will be dependent on CEAS's policy on TA assignment.

Dr. Liang did communicate with Dr. Gary Saulnier, Chair of Electrical and Computer Engineering (ECE) to get a sense of expenses incurred in all of the sub-object codes and from where the under-resourced needs arise and how budget shortfalls are met. Dr. Saulnier mentioned some expenses, such as supplies for courses, IEEE Membership for the Counselor for the Student Branch, and support of visitors, etc. But he noted that the expenses at the department have not been large so far since each new hire has his or her own start-up fund. But once faculty's start-ups are exhausted, they will have to rely on external funding for travel since no travel budget is allocated to the ECE department. For the ESE department, having a budget for travel will be necessary as we need to send students to professional conferences and support them to participate in competitions organized by professional societies.

Comment (Q15): I do not perceive any major weaknesses in the program. Previous comments have suggested some opportunities for additional clarity or definition of select policies and/or procedures.

Response: Clarifications for selected comments/suggestions are addressed above.