



University of Colorado **Boulder**

2018 Program Review

Ann and H. J. Smead Department of
Aerospace Engineering Sciences

Academic Review and Planning
Advisory Committee Report

Approved

A handwritten signature in black ink, appearing to read 'Russell M. Hall'.

04/23/2019

Provost and Executive Vice Chancellor for Academic Affairs | Date

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Process Overview

The review of the Ann and H. J. Smead Department of Aerospace Engineering Sciences (AES) was completed in accordance with the 2018 review guidelines. The Academic Review and Planning Advisory Committee (ARPAC) conducts and writes the final reviews of all Boulder campus academic units. AES completed a self-study in December 2017. An internal review committee of two CU Boulder faculty members from outside of the unit checked the study and issued findings in February 2018. The internal reviewers generally found the report fair and accurate and noted several issues for subsequent exploration by the external reviewers and ARPAC. The external review committee, consisting of two experts within the discipline from outside of the University of Colorado Boulder, visited the unit over April 2-3, 2018, reviewed relevant documents, and met with faculty, students, staff, and university administrators. Internal and external reviewer comments and recommendations are cited at appropriate points throughout the report. This public document reflects the assessment of and recommendations for the Ann and H. J. Smead Department of Aerospace Engineering Sciences as approved by ARPAC.

Academic Review and Planning Advisory Committee (ARPAC)

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Academic year 2018-19
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Unit Overview

The Office of Data Analytics (ODA) annually compiles standardized quantitative descriptions of campus academic units and makes these available online at

<https://www.colorado.edu/oda/institutional-research/institutional-level-data/information-department/academic-review-and-planning>.

This report cites data posted in November 2016, reflecting the state of the Ann and H.J. Smead Department of Aerospace Engineering Sciences (AES) as of the academic year (AY) 2016-17.

Research excellence and curricular strengths distinguish AES as a department known internationally for its accomplishments. The department has established a leading position in the fields of bioastronautics, astrodynamics, satellite navigation, remote sensing, and aerospace science. US News and World Report ranks the AES undergraduate program as among the “top ten” at a public university. By the numbers, the department is among the ten largest aerospace engineering programs in the country.

In 2017, AES received a \$15 million gift from Ann Smead and Michael Byram that entailed naming the department the Ann and H. J. Smead Department of Aerospace Engineering Sciences.

Personnel and Governance

The AY 2017-2018 ODA AES profile enumerates a personnel contingent of 31 tenured and tenure-track faculty members, including 18 full professors, five associate professors, and eight assistant professors. The department also employs three instructors, two lecturers, four research professors, and one scholar in residence. By contrast, the AES self-study lists 44 faculty members (36 tenured and tenure-track professors, three instructors, three research professors, and two scholars in residence) supported by 11.5 administrative and laboratory

staff. AES researchers collaborate with campus and outside institutes including the Laboratory for Atmospheric and Space Physics (LASP), the Cooperative Institute for Research in Environmental Sciences (CIRES), the National Center for Atmospheric Research (NCAR), the National Renewable Energy Laboratory (NREL), the National Oceanic and Atmospheric Administration (NOAA), and the NASA Jet Propulsion Laboratory (JPL). The department also maintains numerous private industry ties. AES FY 2016-2017 sponsored research expenditures totaled \$17M.

The AES bylaws conform to campus norms with regard to executive structure, voting rights, standing committees, and expectations for promotion and tenure. They do not include criteria for annual merit review although they describe the processes of a performance evaluation committee. The bylaws do not address grievance procedures. However, in 2017 AES established an ad hoc bylaws review committee and tasked it with developing such procedures.

Research
and
Scholarship

Six primary clusters comprise the AES research enterprise. These clusters are bioastronautics; unmanned aircraft systems; fluid and solid mechanics; astrodynamics and satellite navigation; remote sensing and aerospace sciences; and a cluster related to the CU Grand Challenge comprising the Integrated Remote and in Situ Sensing Program (IRISS) and the Space Weather Technology, Research and Education Center (SWx TREC)). Tenure-track faculty members lead each of these efforts.

Aerospace science and engineering professional associations including the American Astronautical Society, the Institute of Electrical and Electronics Engineers, the American Geophysical Union, and the American Institute of Aeronautics and

Astronautics count CU Boulder AES faculty as fellows. The faculty contingent includes winners of the NASA Group Achievement Award, the Humboldt Foundation Research Prize, and other awards targeted at early career achievements. The department employs winners of the Women in Aerospace Education Award and the NASA Distinguished Service Medal in recognition of distinguished education and service contributions. Clarivate Analytics has recognized AES faculty members for work garnering among the top 1% of research citations.

The department's record of extramural funding stands as another sign of its excellence. Among the nine engineering units under review, AES had the most grant expenditures for FY 2017-2018 and ranked second on campus for grant awards per tenured/tenure-track faculty member with \$17 million in 2017 (after allocation).

Undergraduate
Education

The department's core undergraduate courses integrate engineering-science theory with hands-on experimental laboratory and design experiences. The undergraduate program culminates in a team-based capstone design course. The hands-on approach has proved popular. According to ODA statistics, AES enrolled 666 undergraduates as of fall 2016, a five-year 48% increase. ODA data for total AES undergraduate student credit hours (SCH) taught showed a 73% increase over the same time period. Sections taught by AES tenured/tenure-track (TTT) faculty averaged 130 students, an 81% increase over five years that places AES's as the largest TTT course sizes among seven departments in this year's review group and the largest among all campus academic departments. Instructor-taught sections averaged 79 students, a 245% five-year increase that places this category of course size third among eight units employing instructors in this year's review

group. AES plans to offer core courses at least twice per year by fall 2019 as a way to make the curriculum more flexible for students. AES is also committed to decreasing the size of lecture sections to no more than 100 students.

Student questionnaires administered by the internal reviewers returned a positive assessment of the undergraduate program. Students reported that they were mostly “satisfied” or “very satisfied” with AES overall (82%). They were mostly “satisfied” or “very satisfied” with AES course sequencing and continuity (85%), with the availability of electives (70%), with staff advising (69%), and with faculty advising (64%). Over 40% were “very dissatisfied” or “dissatisfied” with required course availability and scholarship support. Nearly 20% of respondents registered scores of “very dissatisfied” or “dissatisfied” with research project support. In survey comments, the undergraduates also expressed frustration with poor teaching from some faculty members, with overcrowding, with inequitable treatment by the staff of students deemed excellent, with constantly changing prerequisites, and with busywork homework assignments. Some students reported feeling stressed, overwhelmed, and exhausted.

The self-study notes that a recent US News and World Report survey ranked the AES undergraduate program eighth among public aerospace programs.

Graduate
Education

AES enrolled 282 graduate students according to a fall 2016 ODA census, a 32% increase over five years. The AES MS program accounted for 143 students; the PhD program, 139 students. The external reviewers note that over the past seven years PhDs awarded by aerospace engineering programs have increased 40% and that the AES rate of 0.8 PhDs awarded per tenured/tenure-track faculty member is on par with that of other

top universities. The department's professional master's track has seen enrollments rise from one student in 2015 to 35 in 2017. The department cites the appeal of distance learning for the track's rapid success. The professional MS promises to provide AES with increased revenues and an expanded curricular reach.

The department guarantees its PhD students funding. The self-study notes the difficulty of gaining external funding support for PhD students. AES turns away many highly qualified PhD applicants or offers them admission at the master's level. If the new Aerospace Engineering Sciences building allows AES faculty to garner more research funding, that funding may afford more PhD students support.

Fifty-seven percent of AES graduate students responded to the internal reviewers' survey invitation (161 out of 282 students). Among MS students, 45% responded; 55% of PhD students did. Student responses were generally positive, with 90% "satisfied" or "very satisfied" with the program. However, a prompt to rate the availability of financial support garnered ratings of "dissatisfied" or "very dissatisfied" from 25% of AES graduate students. When prompted to rate program requirement clarity, 22% either indicated "dissatisfied" or "very dissatisfied." An invitation included with the survey to leave comments generated largely favorable ones. Less favorable comments included a few complaints about advising, including some that pointed to the difficulty foreign students have in finding a job after MS completion and their need for special guidance. These students were frustrated by the requirement of US citizenship for many job or research opportunities. Students also perceived a lack of fairness in compensation between teaching assistants and course assistants among MS and PhD students.

AES reports that it awards only PhD students with graduate teaching assistantships (GTAs) and graduate research assistantships (GRAs), with one exception: MS students whom the department recognizes as special recruitment opportunities, such as applicants from underrepresented populations who appear well prepared for success in the AES PhD program, might receive GTA awards. In general, to enter the AES PhD program, a student's faculty advisor(s) must commit to providing them a stipend and tuition support. The department generally grants PhD students with "bridge funding" to satisfy the teaching practicum requirement for one semester, usually as a GTA. The GTA appointment often occurs in the student's first semester (for students hired initially as a GRA, the GTA appointment with bridge funding comes later). Under some circumstances, the department might provide a student longer bridge funding, such as when an advisor faces a funding gap. MS students can gain employment as researchers (paid hourly with no tuition support), or as "course assistants," with duties similar to teaching assistants, but with fewer hours, and in some cases a 20 hour per week cap (GTAs and GRAs have 50% appointments, meaning an expectation of 20 hours per week).

Space
and
Infrastructure

According to ODA, since 2010 AES undergraduate enrollments have grown 45% and graduate enrollments 62%. Over that same time, the department has brought in nearly 20% more research funding. Despite these impressive advances, the department gained only 18% more physical space. Consequently, AES suffers from a lack of adequate offices, laboratories, and meeting rooms. Some staff are housed in what normally would serve as closets, there is little or no available assignable laboratory space, and it is difficult to reserve suitable meeting rooms.

The opening of the Aerospace Engineering Sciences Building in summer 2019 should alleviate these concerns. This building will serve as a focal point for aerospace research and education, providing labs, collaborative research spaces, and immersive educational facilities. The building will accommodate the department's growing student enrollments (anticipated to reach 1200 by 2023), give existing research clusters room to grow, and facilitate the work of new research groups, including the Space Weather Technology Research and Education Center. The building will serve as a focal point for AES efforts to win grants and to attract industry-sponsored research and for appeals to top faculty and students to join the department.

Inclusive Excellence

The department has committed itself to overcoming challenges associated with increasing faculty and student diversity. Since 2010, AES has worked to increase the representation of individuals who identify as women or as belonging to other underrepresented groups in faculty position applicant pools. The number of women faculty members has increased from five (18%) in 2011 to ten (28%) in 2017. The number of faculty members who identify as belonging to an underrepresented minority population has gone from two (7%) in 2011 to four (11%) in 2017.

According to ODA, the number of AES women undergraduate students has dropped by 9% over five years, although AES has seen a recent increase in these numbers with women constituting 36% of the freshman class in the fall 2017 census. The department attributes this increase at least in part to improved messaging and support from the BOLD Center. Meanwhile, the number of AES undergraduates who identify as belonging to an underrepresented minority has increased 40% over the same period. The number of graduate students who identify as women or as belonging to underrepresented minority

populations has increased over this time, by 24% and 21%, respectively. Observing the rate of change, the external reviewers note that the department's success with growing student inclusivity exceeds national aerospace engineering trends.

In a reply to its internal reviewers, AES referenced these national trends, describing the results for a 2017 Aerospace Department Chairs Association survey which counted average enrollments in the discipline (1993-2017):

Since a peak of about 21% women for the average enrollment in 2002, the trend has been a gradual decrease to a relatively constant 15%, with the [underrepresented minority] fraction slowly trending over that time from about 16% to between 20%-25% over the past ten years. The overall fraction of women in AES hovering between 18%-20% for the past seven years is about the same as the national average. Although the AES trend for [underrepresented minority] enrollments has steadily increased from 8% to 14% over that time, this is still significantly less than the national average of 20% to 25% over the past seven years.

AES has not filed an inclusive excellence narrative with the Office of Diversity, Equity and Community Engagement.

Climate

Responses to surveys addressed to AES undergraduate and graduate students by the department's internal reviewers indicate that a majority perceive an overall favorable climate. That said, the survey prompt "AES encourages a climate that is tolerant and respectful of diversity" garnered "strongly disagree" or "disagree" replies from 12% of AES undergraduates and 9% of graduate students, indicating that a sizable group perceives a negative department climate.

In meetings with the AES external review committee, AES women and junior faculty raised the issue of work-life balance.

The external reviewers noted that “in general, junior faculty are highly stressed and need some relief to be successful.” The internal reviewers report that junior faculty expressed confusion about how the department administers its graduate program, for example, in deciding PhD student admissions or in matching PhDs with TA-ships. A more transparent process would be welcome, they suggested. The junior faculty also expressed an interest in having the department implement regular research seminars as a way to maintain and strengthen the department’s research community.

The inclusivity of informal AES faculty networks also came up as a concern in the review. A climate survey administered by ARPAC staff in September 2017 revealed that over 20% of AES faculty members ‘agreed’ or ‘strongly agreed’ that they felt excluded from such networks.

Budget AES expenditures in FY 2016-17 amounted to \$6.5 million. Faculty salaries accounted for \$4.2 million, staff salaries \$596,000, and other expenses \$1.7 million. The department allocated 65% of returned indirect cost recovery monies to its research centers. Endowments and gifts generate additional revenues for AES. The department has not run a deficit in the years since the last ARPAC review.

Past Reviews

ARPAC last reviewed AES in 2011. The committee's recommendations at that time advised the department to seek research- and education-enhancing partnerships, to diversify its research funding, to direct strategic thinking toward growing feasible research areas, to prioritize interactions with department alumni, to consider ways to increase its student credit hour production, to align the AES bylaws with campus guidelines, and to take advantage of College of Engineering and Applied Science (CEAS) and campus efforts to improve diversity and to supplement these with strategies unique to the department.

According to the 2017 AES self-study, AES is engaged in a strategic visioning and planning process that began in 2017 and that builds on the 2010 AES Strategic Vision and Plan. AES has tasked an ad hoc committee with updating the bylaws.

Campus Context

In conducting fundamental, applied, and interdisciplinary research, AES faculty collaborate with campus institutes including LASP and others as mentioned above; with other engineering departments; and with College of Arts and Sciences units, including with the Department of Astrophysical and Planetary Sciences. Areas of joint focus include the implementation of aerospace systems that leverage synergies between aerospace engineering and related sciences.

Disciplinary Context

The department is a national leader in bioastronautics, astrodynamics, and satellite navigation, as well as in remote sensing and aerospace sciences. AES collaborates broadly with leading academic institutions and national laboratories such as the National Center for Atmospheric Research (NCAR) and National Oceanic and Atmospheric Administration (NOAA), as well as with private industry, although not as much as peer departments. AES undergraduate and graduate programs are widely-respected nationally, as indicated by their previously described high rankings. The external reviewers praised the department's engineering and science blend as unique in the field.

Analysis

AES is known for a distinguished faculty, a hands-on undergraduate curriculum, growing student enrollments, an excellent campus and national reputation, and research funding success. The imminent move of AES to a new building on the East Campus in the summer of 2019 is another justifiable cause of enthusiasm. However, ARPAC joins the external reviewers in cautioning that the move will not prove a solution to all problems associated with the department's rapid growth. ARPAC recommends that AES undertake a sustained strategic visioning process designed to guide the department's priorities beyond the summer of 2019. Such work should address issues of communication, collegiality and work-life balance, curriculum, and inclusive excellence, along with the logistical challenges familiar to East Campus-based units.

Strategic Vision

The external reviewers issued a worrying note that “the move to the new building has dominated—literally all—activity in AES recently, [and] a department strategic plan beyond summer 2019 (and the move) seems to be lacking.” The AES self-study referenced a strategic visioning process as a step toward a unified strategic plan. ARPAC encourages AES to complete this work and to address many of the urgent needs brought up during the review. These include:

- Communication improvements;
- An AES staff organization review;
- An updated development strategy;
- A curriculum review, including to define the role of the professional master's track;
- A graduate student support review;
- An undergraduate retention strategy;
- An AES advising review;
- An enrollment management review;
- A hiring plan designed to meet stated enrollment goals;

The department's path forward, including toward possible faculty hires, should be tied to its strategic planning determinations.

Undergraduate Education

With its growing undergraduate enrollments, AES is well positioned to attract even more student interest. Its space minor, designed to provide students with a comprehensive space science background, is an example of the lengths AES is going to engage more undergraduates. However, growing enrollments also reveal resource limits. It is not surprising that 40% of the students surveyed by the internal reviewers reported being “dissatisfied” or “very dissatisfied” with required AES course availability or that almost 20% expressed dissatisfaction with research project support. Students leaving survey comments also point to frustrations in connecting with a faculty advisor and suggest that advising could be stronger. The students noted a deterioration in a sense of community and suggest that AES could put more focus on undergraduate well-being. ARPAC supports AES plans to address student concerns, including to:

- Offer core courses in both fall and spring semesters;
- Work with the CEAS to reconfigure advising;
- Establish a career development and industry relations manager role to assist undergraduates with gaining internships and research positions.

The new building should afford AES the opportunity to reduce class sizes and to strengthen a sense of community. That said, ARPAC shares the external reviewers' question about how AES will transition from a practically-focused curriculum designed for 45 students per class to the needs of a larger student population. ARPAC encourages AES to look into how other departments that offer students hands-on learning have balanced growth with the demands—especially from industry—to matriculate students with relevant practical knowledge.

ARPAC would like AES to make these concerns a focus of strategic planning and to consider how improved communications might help, too.

While some students responding to the internal reviewers' survey praised faculty members for teaching excellence, others reported that professors lacked a teaching interest or that they cared more about research than students' education. Responding to the internal reviewers' report, AES suggested that efforts like sponsoring an undergraduate curriculum retreat focused on evidenced-based teaching and teaching expectations might help. ARPAC also recommends that AES employ the annual merit evaluation process as leverage to encourage good teaching.

The external reviewers flagged student attrition from the major as a concern, noting that graduation totals do not appear to track what might be expected from the enrollment total. The external reviewers did not find the department's answer to this problem—a more flexible curriculum and increased core course offerings—convincing. ARPAC would like AES to better understand its attrition patterns and encourages the department to work with CEAS administrators and others on campus to collect data on why students leave the major. Such information could inform other useful curricular changes.

Finally, internal review survey data indicate that undergraduates could benefit from better scholarship support. AES should work with CEAS and university advancement personnel to improve undergraduate scholarship funding.

Graduate Education

The internal reviewers' graduate student survey pointed to confusion about MS and PhD compensation, including with TA assignment decision-making; dissatisfaction with program

requirement clarity; and frustration with advising quality. The external reviewers reported graduate student criticism of department communication and a lack of uniform mentoring quality. Again, the new building might aid a sense of student community, but ARPAC believes more will be needed, including steps to improve communication and graduate student advising.

Graduate student responses to the internal reviewers' survey reveal that international students are frustrated with the challenges they have in finding employment after completing the MS. ARPAC encourages AES to inform foreign national applicants of the requirement of US citizenship for many aerospace jobs and to consider how it might better advise these students.

The AES professional master's program shows promise. ARPAC is interested in seeing a continued assessment of the program's impact on traditional MS enrollment and on the availability of teaching resources. The internal reviewers' survey shows a low level of AES graduate student satisfaction with financial support. ARPAC again encourages AES to ask advancement personnel to help with fundraising targeted at improving offers pitched to prospective students. Full funding offers upon admission would help AES be more competitive with other top aerospace PhD programs. Funding beyond hourly compensation for MS students should also be considered.

Climate While the internal reviewers' student surveys indicated a climate that overall is tolerant and respectful of diversity, some AES students reported otherwise. ARPAC encourages AES to develop plans to address such concerns. The department should also take steps to improve its communications.

APRAC supports the department's efforts to improve its climate, like plans for monthly department meetings between the chair and assistant professors, the reinstatement of regular research seminars, and strategic visioning retreats focused on climate. ARPAC notes that it did not find information on instructor or postdoctoral fellow mentoring in the department's self-study and encourages the broadening of mentoring efforts to include these populations.

Space and
Infrastructure

The AES self-study made a strong case for acquiring new and improved space, noting that since 2010, its undergraduate enrollments have grown 45%, graduate enrollments 62%, and external research funding 20%. Despite these trends, AES gained only 18% more assigned space in that time. Happily, the department's imminent relocation to a dedicated building on the East Campus will provide AES with vastly improved laboratory, research, educational, and collaborative spaces. AES has every reason to expect the building to positively impact everything from class sizes to retention and climate. ARPAC believes that a strategic plan that lays out a long-term department vision will allow AES to make the most of the new facility.

While AES will not have to manage dual-location concerns as much as other East Campus units, many transportation and parking challenges will be shared in common. AES should join in efforts with CEAS and others to facilitate better connections between the two campuses.

Staff

The internal reviewers expressed concerns about staff workloads and insufficient help directed at grant administration and student support needs. The external reviewers noted a deficit of advancement help (communications, alumni relations, and development) and recommended that AES consider a staff

reorganization with clearer duty delineations. For their part, staff members voiced a desire for flexible working arrangements during the move to the new building and expressed concerns about East Campus parking. AES should take these concerns seriously.

Inclusive Excellence

ARPAC commends AES for focusing attention on community and culture during its fall 2017 strategic visioning retreats and in other efforts. AES appears to appreciate that it is challenged by lower than desired enrollments among individuals who identify as women or as members of underrepresented minority populations. According to ODA data, AES enrollment trends might be changing: underrepresented minority undergraduate and graduate student populations are increasing at a rate that, according to the external reviewers, exceeds national trends. In 2017, enrollments of women undergraduate students also rose significantly, as did those of women graduate students, up 24% over the last five years. Survey results indicate a positive climate for women faculty members and for faculty members from underrepresented minority populations.

As previously described, survey responses indicate that more can be done: 12% of undergraduates and 9% of graduate students “disagreed” or “strongly disagreed” that AES encourages a climate that is tolerant and respectful of diversity. While these are not large numbers, they indicate that some students feel excluded. This warrants increased attention to strategies for developing greater inclusivity. AES should continue to employ CEAS and campus resources (including what the Office of Institutional Equity and Compliance and the Office of Diversity, Equity and Community Engagement can provide) to further perfect strategies aimed at diversity and inclusion.

Recommendations

The members of the Academic Review and Planning Advisory Committee address the following recommendations to the Ann and H. J. Smead Department of Aerospace Engineering Sciences (AES) and to the offices of responsible administrators:

To the Unit:

1. Institute a strategic planning process. Consider the following as prompts for this work:
 - A curriculum review that includes consideration of AES undergraduate experiential learning quality and the role of the AES professional MS degree;
 - Studies directed at improvements in enrollment management, communications, advising, undergraduate student persistence, graduate student financial support, and development success;
 - Completion of a faculty/staff hiring plan that is designed to meet enrollment goals and that defines an appropriate balance among tenured/tenure-track faculty, instructors, and lecturers.
2. Reinforce efforts to recruit faculty members who identify as women or as members of an underrepresented minority population.
3. Optimize opportunities to retain faculty members by continued improvements to the unit climate and to mentoring resources.
4. Incentivize AES faculty members to include undergraduate students in their research work. Take advantage of campus resources like the Undergraduate Research Opportunities Program (UROP). Ensure that undergraduates understand how they may become involved in AES research projects.
5. Work with CEAS to increase graduate student recruitment funding.

6. Continue efforts to improve the climate for students, staff, and faculty.
7. Complete and submit an AES inclusive excellence narrative.
8. Provide postdoctoral fellows and instructors with mentoring.
9. Work with CEAS and ODA personnel to understand where students who leave the major go next, such as to another engineering department or elsewhere at CU Boulder. If applicable, use this information for undergraduate program improvement.
10. Partner with CEAS and campus advancement personnel to develop a fundraising plan to address needs such as increased undergraduate student scholarships and graduate student funding. Base the plan on the department's strategic plan.
11. In cooperation with CEAS, establish and implement guidelines for tenure, promotion and merit evaluation that conform to University of Colorado Board of Regents law and policy.
12. Consider how best to diversify the AES research funding portfolio utilizing the department's connections to private industry.
13. Provide foreign national applicants a clear explanation of the legal limitations of their doing research or seeking employment in the United States, for example, due to national security regulations.

To the Dean: 14. Encourage AES to undertake a strategic planning process.

15. Work with AES to improve and increase graduate student funding.
16. Work with AES to create an undergraduate advising staff plan and to address other AES staffing needs.
17. Work with AES and the Office of Advancement to put together a fundraising plan predicated on AES strategic planning goals.
18. Ask the parking services director to develop short-term parking solutions for personnel in AES and other East Campus units who travel between campuses.
19. Consider how best to support initiatives directed at better Main-East Campus integration.

To the Senior Vice-
Provost for Academic
Resource Management:

Required Follow-Up

The Department of Aerospace Engineering Sciences chair shall report annually on the first of April for a period of three years following the year of the receipt of this report (i.e., April 1st of 2020, 2021, and 2022) to the dean of the College of Engineering and Applied Science and to the provost on the implementation of these recommendations. Likewise, the dean shall report annually on the first of May to the provost on the implementation of recommendations addressed to the college. The provost, as part of the review reforms, has agreed to respond annually to all outstanding matters under their purview arising from this review year. All official responses will be posted online.