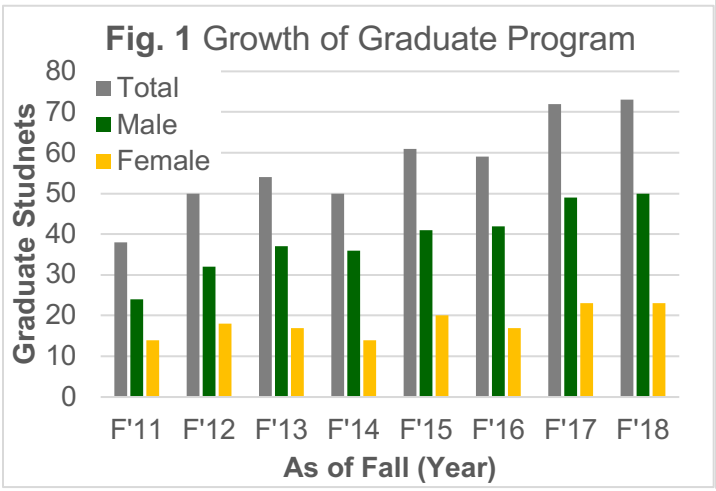
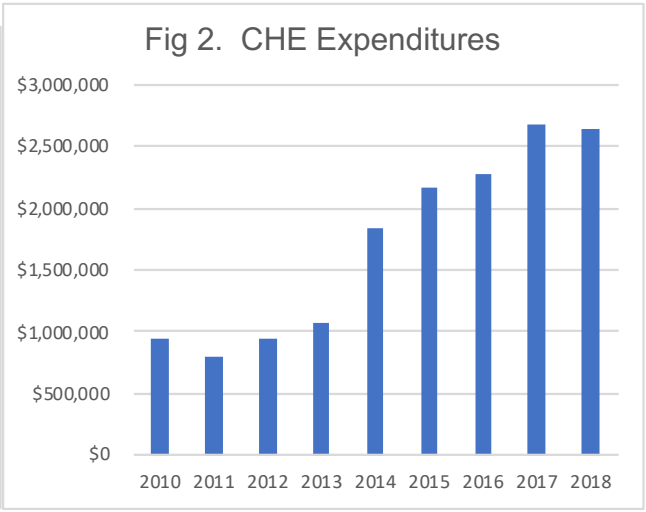
Baylor University
Department of Chemistry and Biochemistry

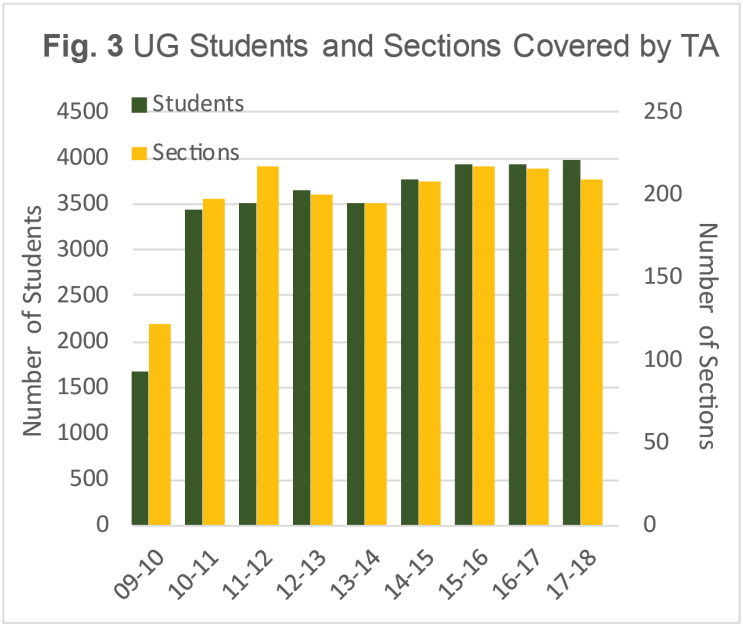
Five-Year Strategic Plan
March 2019

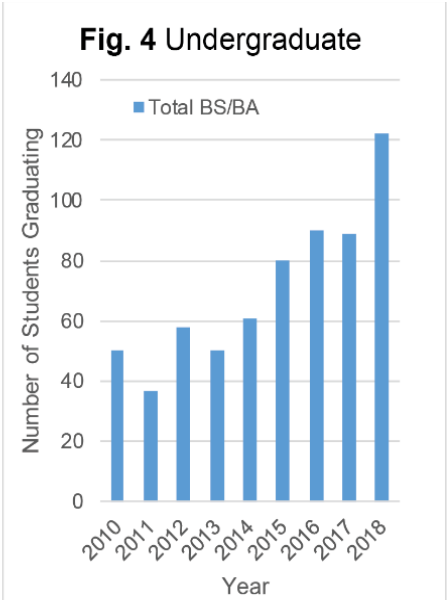
Background:

Baylor University's most recent Academic Strategic Plan, *Illuminate*, highlights Research/Scholarship as one of four foundational pillars. The Department of Chemistry and Biochemistry has and will continue to play a major role in strengthening this foundational pillar by leading Baylor toward the stated goal of becoming an R1 research institution. Beginning with the strategic plan released in 2013, *Pro Futuris*, the Department of Chemistry and Biochemistry increased efforts to improve the research enterprise by hiring highly recognized and productive senior and mid-career faculty, strongly supporting young faculty, and increasing standards for graduate admissions and faculty hiring, promotion, and tenure. Over this period, the Department of Chemistry and Biochemistry has seen a significant increase in research expenditures, external funding, and the size and productivity of the Ph.D. program (**Figures 1 and 2**). Although not directly related to the research enterprise, the Department of Chemistry and Biochemistry has also seen and deftly managed, undergraduate enrollments near 4,000 and a steady increase in majors (**Figure 3**). Baylor ranks 30th nationwide and 2nd in both Texas and the Big XII in numbers of students receiving either a chemistry BA or BS degrees (**Figure 4**).









Tied–30th out of 684 Nationally, #2 in Texas, #2 in Big XII
*Data for Fig. 4 is from the ACS Committee on Professional Training 2016 numbers

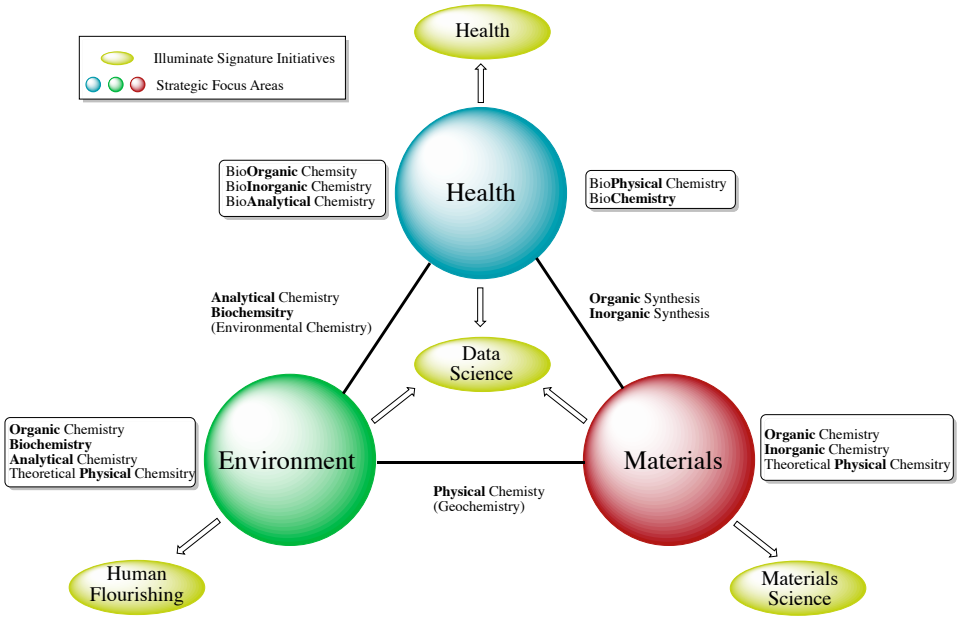
Approach and Overall Objective:

This current five-year plan was developed by a committee that included: Bob Kane, Caleb Martin, Jung Hyun Min, Kevin Shuford, Michael Trakselis, and John Wood. In preparing the current document, the committee met and discussed the strengths and weaknesses in our current operating strategy. The current plan reflects this committee's views on how to build upon our strengths and mitigate our weaknesses and aims to **establish a trajectory** for growth that will produce a Department of Chemistry and Biochemistry comparable to those in aspirant R1 institutions (*e.g.,* Notre Dame) within the next ten-years. We emphasize that this is **not** a ten-year plan but a plan that defines where *we need* to be at the midpoint along a ten-year trajectory to R1. To realistically achieve a trajectory leading to R1-status, the committee recognized an absolute need to be comprehensive and consider changes and growth in many interrelated aspects of our department. In developing this plan we have considered and herein detail: (**I**) strategic focus areas, (**II**) growth of research active faculty, (**III**) space needs, (**IV**) infrastructure supporting research faculty, (**V**) teaching loads and faculty evaluation metrics, (**VI**) TA support, (**VII**) teaching faculty needs, (**VIII**) infrastructure supporting teaching faculty, (**IX**) undergraduate course structure, and (**X**) departmental outreach.

Goals and Objectives:

(I) Strategic Focus Areas. Previous strategic planning committees have identified Health, Materials, and Environment as three interdisciplinary research focus areas that incorporate current departmental strengths and provide for future collaborative growth (**Figure 5**). The current committee concurs with this prior assessment and recognizes that these research focus areas not only continue to fit well with ongoing research programs but also align with four of the five signature academic initiatives outlined in *Illuminate*: Health, Data Science, Materials Science, and Human Flourishing. Our focus on Health and Materials directly correspond to the Health and Materials Science initiatives in *Illuminate*. Our focus on Environment can be considered an integral part of *Illuminate*'s initiative in Human Flourishing. All three of our strategic focus areas also have strong intersections with *Illuminate's* Data Science initiative.

Figure 5



In recent years, chemistry departments have become increasingly interdisciplinary, however, it remains relevant to think of chemistry as comprised of the pedagogically defined areas of Inorganic, Physical, Organic, Analytical and Biochemistry. Indeed, as illustrated in **Figure 5** for our strategic focus on health, these classical areas of chemistry each have an interdisciplinary **bio**logical component and each is currently represented by research active faculty in our department. **Figure 5** also illustrates that conduits between the three strategic focus areas are not only be maintained by research in these classical areas, but also augmented by joint appointments (e.g. current appointments in environmental chemistry/geochemistry and future appointments from physics and engineering). Finally, while we will focus on these strategic interdisciplinary themes for new hires, it is also important that we consider the pedagogical alignment of each faculty with the department's curriculum to meet the need in teaching.

(II) Growth of Research Active Faculty. As a comparative example, the strategic planning committee chose *Notre Dame University* as an aspirant R1 institution. Notre Dame is private and has a strong Christian commitment and an established dedication to excellence in teaching. In addition, Notre Dame has a combined department of Chemistry and Biochemistry, thereby making direct comparison more realistic. As illustrated in **Table 1**, there is significant disparity between our department and Notre Dame. Despite having 40% fewer undergraduate and 20% more graduate students, Notre Dame's

Department of Chemistry and Biochemistry is 100%+ larger than Baylor's in terms of research active faculty. This disparity is so great that, even in a ten-year time frame, reaching parity with Notre Dame would likely prove untenable. Thus, the committee has targeted reaching an 80% comparison to Notre Dame's 2019 levels by 2029. Although by 2029, our department will likely not have achieved parity with Notre Dame, we believe, provided other departments at Baylor make similar strides, that the Department of Chemistry and Biochemistry will fulfill its role in leading Baylor to R1 status.

In terms of strategy and sequencing for hiring, our five-year plan (**Table 2**) is ambitious and involves hiring **8 new faculty** (5-junior and 3-mid-career+); a trajectory that would place us at roughly 2/3 of our R1/ten-year goal (*NB.* As in **Table 1**, this plan assumes success in our 2018/2019 searches and 66% overall search success rate). The sequencing of the hiring plan in years 1 and 2 accounts for needs in specific areas required to meet minimal division numbers for our undergraduate and graduate programs. Importantly, these initial years will be devoted primarily to interdisciplinary areas (e.g., biochemistry, bioorganic, and bioinorganic) at the junior faculty level. Early emphasis on hiring junior faculty will allow these programs to begin generating external grant dollars in time for our move to R1 status. Thus, a success rate of 66% in these searches is seen as a minimum acceptable level and the ability to conduct **three searches annually is critical**. Success beyond these anticipated levels would of course be met with decreased search activity in years 3-5. Clearly, depending upon the nature of the hire, space and financial needs will vary and thus the illustrated numbers are based on estimated averages and are subject to variation.

Table 1

	Baylor (2019)	Notre Dame†	Baylor (2024)	Baylor (2029)
Undergraduates	13,290*	9,000		
Graduates	3,260*	4,000		
Research Faculty (Chemistry and Biochemsitry)	**17**	**39**	**25**	**32**
Inorganic (Farmer, Martin, TBD)	3**	7	5	6
Biochemistry (Trakselis, Min, Shaw, Trawick)	4	12	6	8
Organic (Kane, Pinney, Romo, Wood)	4††	9	6	7
Physical (Bellert, Manzanares, Shuford, TBD)	4**	5	4	5
Analytical (Gallagher, Solouki)	2	6	4	6
Teaching Faculty***	15	8	10	8
Professional Specialists	3	4	4	4
TA-Positions	44	87	66	80
Total Graduate Students	75	190	132	160
Research Expenditure (FY2018)	$31M†††	$140M		

*From Spring 2019 Headcount Enrollment Report.
†Estimated from web page and information provided by Prof. Rich Taylor.
**Assumes success hiring +1 in 2019. †† All over age 55.
*** At Baylor, this includes non research active tenured faculty.
†††Provided by Cindy Todd in the VPR office ($11.4M external and $19.3M Internal)

Table 2

Research Faculty

Search Year	Rank	Space Req.	Start-Up	Justification	Chem. Div.	Questions/Comments
19-20	Open	3-6 Lab Mods.	$0.9-1.5 M	Cancer Initiative	**O**rganic	Chemical Biology
19-20	Assist.	3 Lab Mods.	$900K	Materials Science	**A**nalytical	
19-20	Assist.	3 Lab Mods.	$900K	Cancer Initiative	**B**iochemistry	In Vivo Imaging/Super-Resolution Microscopy
20-21	Assist.	3 Lab Mods.	$900K	Cancer Initiative	**A**nalytical	
20-21	Assist.	3 Lab Mods.	$900K	Materials Science	**I**norganic	
20-21	Full	6 Lab Mods.	$1.5M	Cancer Initiative	**A/B/O** Open	Synthetic/Pharmacology
21-22	Assoc.	3-6 Lab Mods.	$1.25M	Materials Science	**I**norganic	Nano / Catalysis
21-22	Full	6 Lab Mods.	$1.5M	Materials Science	**P**hysical	Optical Materials
21-22	Assist.	3 Lab Mods.	$900K	Cancer Initiative	**B/O**	Immunology
22-23	Assoc.	3-6 Lab Mods.	$1.25M	Cancer Initiative	**A**nalytical	
22-23	Open	3-6 Lab Mods.	$0.9-1.5 M	Cancer Initiative	**A/B/I/O/P** Open	Could be joint BIO
23-24	Open	3-6 Lab Mods.	$0.9-1.5 M	Materials Science	**A/B/I/O/P** Open	Could be joint PHY
23-24	Open	3-6 Lab Mods.	$0.9-1.5 M	Cancer Initiative	**A/B/I/O/P** Open	Could be joint BIO

(III) Space Needs. In accord with the projected growth of research active faculty illustrated in **Table 2**, we anticipate the need for **36 additional laboratory modules**. The strategic planning committee believes that this space should be contiguous to current space in the BSB. *Fragmenting the department into remote locations is not, on any level, an acceptable solution.* In addition to laboratory modules, the anticipated addition of the eight faculty will be accompanied by the associated need of office space as well as an increase in support staff (*vide infra*).

(IV) Infrastructure Supporting Research Faculty. In addition to office and laboratory space needs, research faculty need instrumentation and administrative support. The latter comes in many forms and includes: (1) administrative support with purchasing of supplies and equipment, (2) support for graduate students, postdoctoral fellows, and international (graduate and postdoctoral) students, (3) support for not only post-award grant administration and budgets but also pre-award grant preparation and submission and (4) support for shared instrumentation.

(1) To address the need for support in accounting/purchasing, the committee envisions physically expanding and separating the business arm of the main office and increasing the number of accounting/budget support staff from one (Chris Davis)

Table 3 **Departmental Research Support Staff**

Search Year	Positon	Space Requirements	Justification	Questions/Comments
19-20	Graduate Affairs Assistant	Chemistry Front Office	Cancer Initiative/Materials Science	Space Vacated by Chris Davis
19-20	Purchasing and Finance	New Chemistry Finance Office In BSB	Cancer Initiative/Materials Science	Joins Chris Davis in New Office
20-21	Purchasing and Finance	New Chemistry Finance Office In BSB	Cancer Initiative	Completes P/F Office

to three (**Table 3**). It is also imperative that our purchasing office implement an online-based order system (e.g., Quartzy) department wide to efficiently handle the increased demand from the increased number of research faculty. It may be necessary that we hire a staff person dedicated to implementing the on-line order system during the first year.

(2) To meet the need of a larger department, the committee also recognizes a need to increase the office staff from three to four (Graduate Assistant, **Table 3**) to include: 1. Assistant to the Chair and Office Manager; 2. Assistant for Undergraduate Studies; 3. Assistant for Graduate Studies; 4. Assistant for Departmental Functions.

(3) To address the needs for pre-award support, we propose working with other departments located in the BSB in requesting and supporting an office dedicated to helping science faculty prepare and submit grant proposals. We do not envision this support as involving the writing of the proposals themselves but as facilitating submission to the point where faculty need only supply the scientific aspects of a proposal and ancillary needs (formulated in terms of personnel, equipment and supplies). All other aspects of submission would be left to the pre-award support staff. In addition, we envision the staff in this office as being housed in the BSB so that they can become intimately familiar with ongoing research in the departments under their care and thus better able to help faculty identify potential grant opportunities and facilitating collaboration among departments and individuals.

(4) To address the need in managing the shared instrumentation, we recommend that the current committee for *Instrumentation, Safety, and Facilities* provide a report regarding current departmental instrumentation needs and, if necessary, prepare and submit grant proposals aiming to replace or purchase new instrumentation to adequately support research and teaching at the undergraduate and graduate levels.

(V) Teaching Loads and Faculty Evaluation Metrics.

Teaching Load Assessment. Typical teaching loads at R1 institutions for research active faculty are two courses per year. Although we have worked toward developing rubrics that allow for teaching loads to drop to this level for research active faculty, the committee believes that it needs further refinement. *We propose that teaching loads be based solely on external grant dollars* (**Table 4**). The committee believes that in order to be successful in obtaining external funding, one must be publishing at a rate that conforms with the standard of one's particular field, and thus *making teaching load assignments based on funded grants* accommodates different publishing rates within the subdisciplines. Importantly, the rubric outline here not only rewards *successes* in obtaining external funding but also allows faculty time to recover from temporary lapses in funding before increased teaching loads are imposed. As with numbers of publications, access to absolute numbers of grant dollars also differs across the subdisciplines of chemistry. To mitigate disparity, the external funding levels used in this rubric are believed to be universally accessible. Lastly, we believe the teaching load of 1:1 for highly active research faculty should be justified by formally acknowledging that these faculty are engaged in teaching through group seminars and mentoring respective students enrolled in research and dissertation courses.

Table 4

Research Acitvity	Funding Level	Teaching Load
High	>$100K/yr	1:1 One semester off for each 3rd year of continuous funding of >$100K.
Moderate	$50-100K/yr	2:1
Low	<$50K/yr & 2 proposals/yr	2:2
	<$50K/yr & ≤ 1 proposals/yr	3:2
None	Tenured faculty with $0 for 3 years will be designated as having No Research Activity and will no longer be eligable to accept graduate students.	3:3
Tenured Teaching Faculty	Tenured faculty with No Research Activity will, following graduation of their final student or that student's 5th year, forfeit their lab space and be designated as Tenured Teaching Faculty.	4:4

Teaching Load Comments:
- Funding is the larger of AY funding or 3/year rolling average.
- Funding is total (direct + indirect) adjusted by % on routing form.
- If research status is maintained for one year, any change in teaching load that results from funding loss will be implemented after a 1-year grace period and incrementally by 1 course/year. (e.g., 1:1 goes down over three years, Year 1 - 1:1 (grace period); Year 2 - 2:1 (first increment); Year 3 - 2:2 (second increment) etc.
- There is no grace period for lack of proposal submission in the LRA catagory.
- Provided courses can be covered, movement to lower teaching loads can occur in the semester immediately following a funding increase.
- All research active faculty must teach 1 undergraduate course/yr.

Faculty Evaluation. With regard to faculty evaluation procedures, the committee believes that the current approach is simply a comparative analysis and as such counterproductive. The process is also unnecessarily time-consuming for faculty as well as staff. The committee believes the process should be streamlined and based only upon outcomes that matter. For research active faculty, we believe linking the assessment to funding and how it is deployed would be a more accurate measure of scholarly

behavior; this is in contrast to the currently employed metrics of counting proposal submissions and publications (**Table 5**). Lengthy author lists and numerous collaborators makes judging both contributions to grant submissions and publications challenging. Moreover, the mere number of publications is not a metric that can be applied uniformly across the subdisciplines of chemistry and is therefore not an objective measure of faculty productivity. *Hence, we believe that faculty evaluations should focus on a more objective metric that is independent of relative numbers amongst colleagues.* In considering alternatives, the committee recognized that we subject our graduate students to a significant disservice by keeping them on TAs for too long. This practice not only puts the students at a disadvantage in comparison to peers at other institutions, but also jeopardizes safety by often leaving unfragmented larger blocks of time for research to the evening hours when the building is less populated. In light of these facts, the committee believes making a TA/RA ratio an integral part of the assessment rubric would incentivize faculty to support more students with RA whenever funding permits. This rubric thus intends to discourage faculty from diverting funds from RA support in order to hire a postdoc, take on graduate students they cannot support, etc. Moreover, it is important for faculty to be reminded that TA slots are a resource shared by the department and misuse of this resource is done not only to the detriment of our graduate students but also at the expense of one's colleagues. To further acknowledge the importance of supporting graduate students on RAs instead of TAs, we herein provide departmental guidelines for accepting graduate students into research groups based on actual numbers of students supported by TA or RA (see, **Appendix 1**).

Table 5

Research Acitvity	TA/RA Support	Assessment
High	>$100K/yr TA/RA < 0.5	Noteworthy
	>$100K/yr TA/RA 0.5-1	Effective
	>$100K/yr TA/RA >1	Marginal
Moderate	$50-100K/yr TA/RA ≤ 1.5	Effective
	$50-$100K/yr TA/RA > 1.5	Marginal
Low	<$50K/yr TA/RA ≤ 1	Effective
	$0-$50 K/yr TA/RA > 1	Marginal

Assessment comments:
- Faculty will be rated as 'Noteworthy' any year they move up a category (e.g., from low to moderate). Movement up two categories will result in a rating of 'Exceptional'.
- High research activity faculty will be rated as 'Exceptional' in a year where their funding (adjusted by % on routing form) increases by $100K/yr. This is a one year ratings for the year that the increased funding is acquired.
- Faculty receiving major national or international awards will have their rating incremented up one rank (e.g., 'Effective' to 'Noteworthy').

(VI) TA Support. There is no question that improving the graduate program by increasing the numbers of research active faculty will have a positive impact on undergraduate education, provided these faculty continue to engage undergraduates in both the classroom and research laboratories. Accordingly, the teaching load rubric (**Table 4**) indicates that all research active faculty must teach at least one undergraduate course (defined as a 3-credit hour course) per year. Preferably, to achieve maximum exposure of research faculty to undergraduates, the majority of teaching by research active faculty should be in classes with large enrollments. It is important pedagogically for undergraduate courses in chemistry to be accompanied by problem solving sessions and significant interactions between the students and faculty. Teaching assistants play a critical role in enabling this teaching paradigm and mitigating its negative impact on the faculty member's research efforts. To ensure access to teaching assistants, the committee believes our department and the University should be providing TAs in an objective and consistent fashion. For TA's to be assigned objectively and consistently the committee believes it critical that these assignments be made in accord with undergraduate enrollment and with the goal of maintaining a given student / teacher (including faculty+TA) ratio. Faculty and undergraduates alike should be assured that the student/Faculty+TA ratio is less than 50:1. The current practice of pronouncing small section sizes is misleading as a single faculty member is often assigned to teach multiple sections of the same course. With regard to research active faculty, it is simply not possible to maintain excellence in teaching when single-handedly managing a class of ≥30 (let alone 50) while simultaneously being expected to meet expectations (as defined in annual activity reports) by writing papers, preparing proposals, serving as peer reviews of manuscripts and proposals, mentoring postdoctoral- graduate- undergraduate-students, serving on departmental and university committees, traveling around the world to give lectures/promote Baylor, hosting external visitors and job candidates, and maintaining compliance (waste, safety, title IX, important/export, etc.). As with the administrative and grant support infrastructure mentioned above, *it is absolutely critical that teaching assistant support be made consistent and reliable.* To provide more consistent and reliable access to TAs the committee is recommending that one TA assignment be made for every 50 undergraduates enrolled in a given undergraduate lecture course and that the majority of these TAs should be current graduate 1st and 2nd year students. Given that undergraduate enrollments in lecture courses have remained relatively stable, assigning TAs in this fashion will allow for much better planning with regard to course staffing and graduate recruitment. A plan for phasing recitation sections into our major lecture courses and thereby accommodating the associated growth of our graduate student population is included as **Appendix 2**.

(VII) Teaching Faculty Needs. Importantly, we **do not** anticipate increases of research faculty being met with concomitant increases in lecturers. However continued reliance on lecturers and a slight increase in teaching by non-research active tenured faculty is expected. We do envision the undergraduate laboratories being largely, if not exclusively, under the guidance of either tenured, non-research active faculty or more likely by non-tenure track teaching faculty. In reviewing the current laboratory structure several serious deficiencies were noted. To rectify these deficiencies this five-year plan envisions, as illustrated in **Table 6**, a net change of two wherein the undergraduate general and organic chemistry laboratories will be supported by 2 Laboratory Coordinators (non-Ph.D. level 12-month staff position, *reduction of one*) and 3 Laboratory Lecturers (Ph.D. level *newly defined* 10-month position, *increase of three*). It should be noted that our General and Organic Chemistry Undergraduate Laboratories are overseen by three Ph.D. level 12-mo. Staff. These staff are responsible not only for the logistics (purchasing of supplies, laboratory set-up and maintenance) but also the associated lectures, curriculum and associated TA's. Thus, they are essentially performing two job functions, have no time for curriculum development, and lack parity to their 10-mo. Ph.D. level lecturer counterparts. The plan proposed here frees time for course development, provides enough redundancy to allow for unexpected loss of personnel, and establishes parity among the Ph.D. level teaching faculty.

Table 6 **Teaching Staff: New / Replacements (Repl.) / Redefined (Redf.)**

Search Year	Positon	Space Requirements	Justification	Questions/Comments
19-20	Lecturer		Crucial to Cover Undergraduate Courses	**Repl.** for Alton Hassle
19-20	Lab Lecturer*		Crucial to Cover Undergraduate Lab Courses	**Repl./Redf.** 10 mo. for Mieke Lahousse
19-20	Lab Coordinator**	Office Space Required (Shared)	Crucial to Cover Undergraduate Courses	**New** 12 Mo. Staff to Oversee Lab Logistics
20-21	Lecturer		Crucial to Cover Undergraduate Courses	**Replacement** for Jesse Jones
20-21	Lab Lecturer		Crucial to Cover Undergraduate Courses	**Repl./Redf.** 10 Mo. for Clinton George
20-21	Lab Coordinator	Office Space Required (Shared)	Crucial to Cover Undergraduate Courses	**New** 12 Mo. Staff to Oversee Lab Logistics
20-21	Lab Lecturer		Crucial to Cover Undergraduate Courses	**Redf.** 10 Mo. for Dennis Rabbe

*Lab Lecturer: Is a new title and designates a 10 mo. Ph.D. level position assigned to the teaching labs.
**Lab Coordinator: 12 mo. staff postion. Non Ph.D.-Level. Will coordinate laboratory logistics for the Lab Lecturers could share office.

(VIII) Infrastructure in Support of Teaching Faculty. To effectively manage multiple courses with often a large number of students and yet to be able to fully dedicate oneself to excellence in teaching, the teaching faculty also require adequate infrastructure and support. In addition, tenured teaching faculty often continue to serve as peer reviewers and have other professional activities outside of teaching. The committee thus recommends that the TA assignments outlined above would also serve to support teaching faculty. In addition, staff dedicated to undergraduate affairs should support teaching faculty in terms of course enrollment issues, preparing printed course materials, etc.

(IX) Undergraduate/Graduate Course Structure. As previously mentioned in section (VI), low average class sizes do not necessarily correlate to low student/faculty ratios since faculty are often required to give the same lecture to multiple sections of the same course each week. This not only creates a false impression of true student/faculty ratios but also is an inefficient use of faculty time. Larger section sizes staffed by faculty with associated TA's, assigned in accord with class size, charged with holding recitation sections is a model we should be moving toward. The effectiveness of such a model has been demonstrated by two recent Cherry Awardees Brian Coppola (U. of Michigan) and Neil Garg (UCLA). The undergraduates currently enrolled in Neil Garg's class (CHE 3332) will be asked to compare their experiences with CHE 3331, which had neither recitation sections nor TA support. [In a recent in-class poll, students in Professor Garg's class were asked if the they thought the current recitation scheme should be implemented at Baylor. In response, 90% of the students responded yes.] In addition to improving efficiency and student/Faculty+TA ratio transparency, a move to larger class sizes, facilitated by increased TA support and associated recitation sections, will better enable us to bring our teaching load requirements in to parity with aspirant R1 institutions. A natural consequence of this change will be a need to move away from defining workload by counting sections taught.

(X) Departmental Outreach and Service. The department currently organizes several events throughout the year that is open to public (Advanced Instrumentation Workshop, Gooch-Stephens lecture, W. Dial Black lecture, etc.) and each faculty also contribute to the community and outreach through giving lectures and providing professional/educational services at Baylor as well as in other higher-education institutions and local museums and schools. We anticipate that the recruitment of new faculty and staff will create new and synergistic opportunities that we, as a department and an institution, will continue to employ in serving the community.

Summary:

The strategic plan outlined above focuses primarily on changes that are needed to put our department on ten-year trajectory to R1. The plan focuses on new growth and does not account for attrition of the current faculty through either retirement of loss by outside recruitment. Although replacement of current faculty is not necessarily accompanied by new space or support staff needs, start-up funds in line with those outlined in **Table 2** would be required. Thus, given that retirement and outside recruitment of existing faculty are inevitable, the overall financial costs of the strategic plan outlined here are likely low. Importantly, as a committee, we do not believe that we have approached the development of this plan by outlining twice what we need so as to eventually receive half. We have attempted to be logical in our assessment and focus on changes that would be imperative in moving to R1. At the very least the strategic planning committee believes that what is provided here is a realistic assessment of just what the aspiration to become R1 will require in Chemistry and Biochemistry.

Overall, with regard to new growth we envision over five years:

- *Growing the faculty by 8 (Assumes success in our 2018/19 faculty searches).*
- *Start-up costs as outlined in Table 2.*
- *Increase in contiguous space by 36 modules.*
- *Increase in support staff by three. Two business and one main office.*
- *Space associated with relocating the business office.*
- *Relocation of Sponsored Programs Personal and Creation of a BSB grant support office.*
- *Space associated with the creation of the grant support office.*
- *Implementing outcome-based metrics for teaching load reduction of research active faculty.*
- *Implementing outcome-based metrics for research active faculty assessments.*
- *Restructuring of the method for assigning TA-lines to an undergraduate enrollment basis.*
- *Defining a faculty+TA/student ratio for undergraduate lecture courses.*
- *Formalizing problem/recitation sections for undergraduate lecture courses.*
- *Expanding the staffing for undergraduate teaching labs by two.*

Appendix 1

Guidelines for research faculty accepting Baylor Chemistry and Biochemistry Graduate Students into their groups.

As the funds provided by the Graduate School to our department to support graduate TA stipends are a communal benefit to all research faculty, the distribution of graduate student TA support needs to be allocated collectively. These guidelines are intended to formalize the selection of graduate students into groups from the research faculty standpoint. Research faculty should be cognizant and self-abiding to these guidelines when planning the future size of their group. Currently, the grad school provides an equivalent of 42 graduate TA stipends (@24,000/yr) (beginning Fall 2019). There are 17-18 primary research active faculty, and 1 secondary faculty member within Chemistry and Biochemistry that have or have taken graduate students. Every attempt will be made to give incoming students their first choice of research groups according to the following guidelines:

Primary Faculty in the Department of Chemistry and Biochemistry

1. At a minimum, two students may be supported by TA for any research active group.
2. A third student may be supported by TA for those labs with a recent (but currently lacking) record of graduate student RA funding or for those labs who are actively writing proposals that would fund graduate student RAs.
3. One additional TA will be supported for every two students supported by RA (from external funds).

Secondary Faculty in the Department of Chemistry and Biochemistry

1. One student may be supported by TA for any research active group.
2. One additional TA will be supported for every two students supported by RA (from external funds).

Students will be allowed and encouraged to rotate in any laboratory independent of funding, however they should be made aware of their reasonable ability to be accommodated into a group by the PI.
These guidelines will be followed at the time of graduate student group selection at the end of the Fall semester. All research group choices are subject to approval by the GPDs and the Graduate Affairs Committee and can be dependent on funding, space, current support, etc. Every attempt will be made to maintain students in selected research groups (support by either RA or TA) throughout their graduate education independent of funding.

The ultimate goal is to be able to grow the graduate program significantly over the next 5-10 years though the addition of more research faculty and further significant external funds. We also recognize the need to have more TA support for undergraduate laboratories and classes. Therefore, we anticipate that students supported by both TA and RA will grow concurrently. This is consistent with Baylor's current mission to work towards R1 status.

March 2019
Codirectors of the Graduate Program in Chemistry and Biochemistry
Michael Trakselis (Director of Graduate Affairs)
Kevin Shuford (Director of Graduate Recruiting)

Appendix 2

Phased Growth. The strategic plan calls for significant growth in graduate student numbers and this growth will be accompanied with concomitant growth in Teaching and Research Assistantships. As illustrated in Table 1, reaching an ca. 80% comparison to our aspirant institution (Notre Dame) in ten years, on a trajectory designed to achieve ca. 60% of the requisite growth in five, will increase our graduate student population by 57 in the time-frame of this strategic plan. Importantly, this growth MUST be achieved whilst maintaining, if not improving, the standards and quality of the incoming graduate students. Given that the current applicant pool would not sustain these numbers, this growth will also necessarily be accompanied with an increased emphasis on graduate student recruiting efforts. The plan to add recitation sections to our major lecture courses will need to be paced with growth of our graduate student population. At present, our departments graduate recruiting efforts are proving most successful in the biochemistry and organic divisions, thus implementing recitations for the lecture courses associated with these divisions (i.e., Biochem. 4341/4342 and Organic Chem. 3331/3332) will be addressed first. As the graduate program continues to grow, similar recitation sections and teaching assistantships will be distributed to the analytical (Chem 2416) and general chemistry (Chem 1300/1301/1302/1405) lecture courses. Given classroom space constraints within the BSB, we anticipate these additional problem-solving recitation sections as being schedule M-Th in the evening hours (6-8 p.m.). Table A1 illustrates the current lecture courses that have student populations significant enough to warrant Teaching Assistant support, proposed additional recitation sections, and the associated Teaching Assistantship assignments. As illustrated, within the timeframe of this current strategic plan it will likely be possible to implement this new teaching paradigm in only those lectures associated with Organic and Biochemistry.

Table A1

Phase-In of Teaching Assistants and Recitation Sections

Academic Year for Phase-In	Chemistry Course Number	Enrollment F18 / S19	T.A. Requirement*	Additional Sections**
20-21	Biochemistry 4341/4342	250 / 293	6	15
21-22	Organic Chem. 3331/3332	752 / 822	16	40
25-26	Analytical Chem. 2416	93 / 37	2	5
25-29	General Chem. 1300/1301/1302/ 1405	1157 / 1187	12	30
Totals 5-yr			22	55
Totals 10-Yr			36	120

*Number is based on maintaining < 50:1 student to T.A. ratio in upper level classes and 100:1 in General Chemistry and the highest enrollment observed in the preceding academic year.

**Number is based on a section size of 20 students in upper level classes and 40 students in general chemsitry and the the highest enrollement observed in the preceding academic year.