



Respectfully Submitted: Craig Gatto, *Interim* Chair

I. Accomplishments and Productivity for FY22

A. Accomplishments for FY'22

1. We submitted **17 grant proposals** last year requesting \$4M in extramural support. Unfortunately, we only received 1 collaborative award for \$5,347 in extramural funding.
2. We have maintained our enrollment level from last year with ~140 majors. With an average tuition of about \$1M/100 students, Chemistry is generating approximately **\$1.4M** per year in tuition revenue to the university. However, the department provides a substantial service by offering several courses for other STEM and health-related disciplines. Thus, we average ~13K credit hours per year which generates **~\$5M** in tuition. Thus, Chemistry generates nearly 1.5 times more revenue per year than it costs the University.
3. Chemistry had **30** publications last year and **26** of those had student co-authors (several students had >1 co-authored publication). In addition, we had 3 book chapters published, all three had student co-authors.
4. We had **22** presentations at Regional and National Conferences with all of them including student co-authors.
5. Successfully hired **Dr. Susil Baral** to fill our vacant Physical Chemistry positions.
6. Successfully hired **Dr. George Barnes** as the permanent Chair of Chemistry.

B. List the unit's goals and how the goals support Educate•Connect•Elevate.

Major Goals for FY'22

Goal #1: Recruit two Tenure-Track faculty.

Strategic Plan Alignment: CHE Goal 2, CAS Strategic Focus 1 & 3, *Educate-Connect-Elevate* Goal 1

We were **50% successful** in this goal. We were only given one position to hire, which we did successfully filling our Physical Chemistry vacancy. It is critical that we get to replace at least two new TT faculty with searches in Fall 2022.

Goal #2: Increase Graduate Assistant budget

Requested Funding: (**\$76,950**; six additional MS stipends), permanent

Strategic Plan Alignment: CHE Goals 1 & 3, CAS Strategic Focus 3- Goals 1 & 2, *Educate-Connect-Elevate* Goal 1

Rationale: The success of an institution has only one real measure - the success of its students. This in turn is dependent on the quality of the students and the effectiveness of the programs. Part of the collateral damage caused by our lost faculty numbers is the ability to offer our upper level and graduate courses at a frequency that ensures students can graduate on time (even with a hiccup along the way). We offer them often enough that on paper undergraduates can finish in four years and graduate students in two years. However, in many instances, this is not the case as the infrequency of offerings of some required courses provides zero degrees of freedom for student scheduling. This is in part due to the necessity of having faculty present and instructing laboratories, even at the 100-level. Not only does this stretch our ability currently, it provides ZERO room for instructional growth; that is, the current *modus operandi* in Chemistry cannot accommodate the projected increased need for General Chemistry due to Engineering and Nursing expansions. These programs will require offering additional lecture sections of CHE 110 and CHE 140, with concomitant increases in the number of accompanying laboratory sections. Thus, the most economical way to increase the number of Chemistry majors AND increase the number of seats in service courses is a combination of additional faculty (see above), additional graduate students (this request), as well as removing faculty from teaching 100-level laboratories. The latter is a philosophical change that I have already begun to discuss with the Chemistry faculty and many are starting to see this as a win-win scenario.



We were **unsuccessful** in this goal as we received no additional GShips. This remains the most economical way to increase enrollment in General Chemistry, but it will require a change in departmental culture.

Goal #3: Replace/upgrade Teaching Laboratory Equipment

Strategic Plan Alignment: CHE Goals 1, 2 & 3, CAS Strategic Focus 2, 3 & 4, Educate-Connect-Elevate Goal 2 & 4.

Rationale: We continue to make progress maintaining and replacing equipment that was purchased in the 1990s with absolutely no plan to maintain or replace it. The new AEF effort is a tremendous mechanism moving forward and truly the first functional forethought that has come out of ISU in my 20+ years. Unfortunately, most of the equipment in the Science Laboratory Building was purchased in 1997, so the demands are more than the AEF can accommodate (total cost is in the millions of dollars), so we continue to do our part to chip away it and ask for additional assistance from the College and University if funds are available. Like, many of my colleagues in Biology, I want to thank my CHE colleagues who have willingly contributed their extramural grant resources to help finance equipment that can be shared with others in the Department and even utilized in instructional laboratories.

The items listed below are what we focused on in FY22.

- Nano Liquid Chromatography for High-resolution Mass Spectrometry - **\$102,675**. This equipment will be mostly utilized in our analytical teaching laboratories (CHE 216 and CHE 316). In addition, this will be extensively used by students doing research projects in Analytical Chemistry. Funding: *AEF, CAS temporary funds, and/or CHE SBC/GR*.

Successful. We purchased this in November, but it was backordered and scheduled to arrive in May. In addition, as the cost of this item was about \$10,000 less than quoted, we requested to use the additional funds towards replacing the motherboard in our Mass Spectrometer for our Analytical Chemistry labs. This was approved and we added ~\$3,500 from the department budget to purchase the motherboard as well.

- Student workstation & operational equipment replacement for Physical Chemistry labs. **\$18,500**. Items: Two vacuum line manifolds (\$1,600 ea); Pressure Transducer w/ gauge (\$2,100); Two Ion Selective electrodes (\$4,500 ea); Three Vacuum pumps (\$650 ea); Digimelt auto melting apparatus-two (\$900 ea); Three Ag/AgCl Reference Electrodes (\$150 ea). Courses utilizing these items are: CHE 361 & 363. Funding: *AEF, CAS temporary funds, and/or CHE SBC/GR*.

Successful. (but **not** funded). We were able to get this accomplished with Departmental funds.

- NextGen 100 CombiFlash Chromatography System - **~\$39,146**. This GC system will be used in several teaching 200-, 300-, and 400-level teaching labs for analyzing many different products. This instrument will be used in the following labs: CHE 216, 233, 251, 316, 343, 351, and 373. Funding: *AEF, CAS temporary funds, and/or CHE SBC/GR*.

Unsuccessful. Still needed. Will likely purchase with Departmental funds.

- High Performance Liquid Chromatography – FSA - **\$35,000**. This is a versatile instrument that facilitates the separation of chemical species based on their properties (pH, hydrophobicity, size, etc.). The current HPLC system was purchased with the new building (1997). Although it is currently working, the manufacturer says they no longer have parts available so when it goes down it cannot be repaired. Funding: *AEF, CAS temporary funds, and/or CHE SBC/GR*.

Unsuccessful. Still needed. Will likely purchase with Departmental funds (or previous item).



C. List major accomplishments for each goal. Please consider reflecting on teaching, research, and service accomplishments. See Above section B.

D. Provide specific accomplishments related to Academic program development.

- Completed a complete initial draft of the Biochemistry Major 8-year program review and submitted it to the College of Arts & Sciences and subsequently to the Provost's office. We are waiting for feedback to see where we can improve and then implement the suggested changes.

E. Provide specific accomplishments related to Equity, Diversity, and Inclusion.

- Interim Chair Gatto along with Professors Hitchcock and Hunter, are members of the steering committee for the formation of the STEM DEI Taskforce chaired by Dr. Rebekka Darner (<https://cemast.illinoisstate.edu/scholarship/broadersupport/>). The committee has been meeting bimonthly over the last year. The committee and its subgroups are tackling several issues (e.g. Implicit bias, recruitment retention, FTIC, freshman success, curriculum). We understand that this will be a long and continuing process that hopefully will develop best practices to be incorporated into STEM departments governance documents.
- Chemistry once again played an active role in ISU student STEM Alliance (<https://cemast.illinoisstate.edu/students/college-students/stem-alliance/>) and Dr. Szczepura from Chemistry along with Dr. Sadd from Biology orchestrated the annual STEM Alliance awards ceremony and keynote speaker.

F. Provide specific accomplishments related to Faculty Success.

- Maintain a departmental stock room that where supplies are maintained off the Departmental operating budget, where faculty can go to get commodities needed for their research programs.
- Provide additional travel support to present their research at National Conferences.
- Revised the Departmental ASPT document to more clearly articulate what expectations for satisfactory productivity in teaching, research, and service.
- Made some critical moves with regard to research space allocation to optimize research productivity and make space available for future hires.
- Initiated some differential teaching assignments to better align faculty assignments with their productivity variation in teaching, research, and service.

G. Provide specific accomplishments related to Student Success.

- The department supports a robust student association ("ChemClub") that provides students with an identity sense of belonging. It is always one of the most appreciated things articulated by our graduating seniors.
- Part of our GA teaching assignments is that they sign up for tutoring hours in the Department's Student Resource room, so our students can drop in at anytime and get tutoring help.
- Provide individualized attention in our research laboratories for enhanced student learning and engagement. Greater than 80% of our students have undergraduate research experience when they graduate.
- Provide travel funds for students to attend national conferences and present their research.

II. Internal Reallocations and Reorganizations in FY'22.

A. Describe any reallocations or reorganizations, including the movement of positions, upgrade of positions, creation of new positions, or reallocation of personnel or operating funds.

- Moved **\$16,000** from GR to Personnel to provide summer compensation for Associate Chair (\$8,000) and Directors of Undergraduate and Graduate Studies (\$4000 ea). These positions are substantial throughout



the year and require work during the summer as well. The compensation is commensurate with their contributions to Departmental operations.

- Moved **\$29,000** from Stockroom Personnel line and **\$3,150** from GR to our GA budget. We have been unable to hire someone to fill our Stockroom Assistant position. Thus, we opted to fill this full-time position with two graduate students. These MS stipends will be two 12-month appointments annually.
- We expanded our advisor to include advisement of Physics majors as well and expanded our Chemistry Teacher Education advisor to include Biology Teacher education majors as well.

B. Describe how the unit used additional funds from the Provost Office to enhance accomplishments and productivity. Additional Provost Office funds could include funding sources such as: Instructional Capacity funds, Summer Session funding, Academic Enhancement Funds, or variance dollars.

- We used **\$20,124** in Temporary IC to hire NTT Jeff Templeton to cover additional 6 laboratory sections of General Chemistry.
- We used **\$15,376** in Temporary IC to hire Dr. Ana Dmytrejchuk to cover additional 3 laboratory sections of General Chemistry and 1 section of Organic Chemistry.
- We carried **\$24,300** from our GA budget into the summer to support the GAs with a one-month summer salary RAship. This "extra" GA money resulted from 9 of our international students not able to get visas and had to delay arrival by a semester.
- We used **\$25,130** in Summer Session Funding to pay Drs. Jon Friesen, Aparna Idate, and Elisha Swanson to teach CHE 242, CHE 230/231, and CHE 102, respectively. In addition, this support also covered 1GA and 2 UTAs to help in the laboratories.

C. Describe how the unit used additional funds from College/Department/School/Unit to enhance accomplishments and productivity. Additional College/Department/School/Unit funds could include such as: external funding, Foundation funds, variance dollars (note: this does not include variance dollars from AIF), or external contracts.

- We received **\$15,000** in undergraduate research awards to support students doing independent research this summer.
- We used **~\$8,500** from Departmental Foundation accounts to award 11 undergraduate scholarships of varying sizes (Sol Shulman Awards, James Sedgwick Awards, Outstanding Student Awards).
- We used **~\$28,000** of our IDC funds to support PI and student research with minor equipment repair and commodities purchases.
- We committed **~\$140,000** of Department, College, and Provost dollars from several years ago to Facilities to finish "keycard access" locks on several laboratories. Facilities transferred the money back to us at the beginning of the fiscal year, but the work has not been completed. We are holding the money and will again SBC it while we wait on Facilities to order parts and supplies and then perform the installation on the doors we agreed upon.
- The department annually expends **~\$75,000** on annual service contracts for critical instrumentation (e.g., NMRs, Mass Specs., Autoclave, Xray Diffractometer, etc.).
- We committed **~\$113,000** (\$73K from CAS, \$40K from CHE) to the second-year disbursement of the start-up package for Dr. Bhaskar Chilukuri.
- The department annually expends **~\$48,000** on Liquid Nitrogen and **~\$20,000** on dry ice to support Chemistry and Biology research and teaching needs.



III. Major Objectives for FY'23

Objective #1: Recruit two Tenure-Track faculty positions.

Strategic Plan Alignment: CHE Goal 2, CAS Strategic Focus 1 & 3, Educate·Connect·Elevate Goal 1

Requested Funding: (\$334,000; two TT lines w/ start-up pkgs)

#1 **Inorganic Chemist** - annual salary = \$72,000.

Start-up costs will total approximately \$130,000. We are requesting \$90,000 from the College (\$60,000 in FY24; \$20,000 in FY25; \$10,000 in FY26) and Chemistry would support the remaining \$40,000 over the same three-year stretch.

Rationale: With the loss of Drs. Sullivan, McLauchlan, and Webb, we are down to three Inorganic Chemists. This subsection of Chemistry usually makes up ~30% of the departmental faculty members given the breadth of the subdiscipline and now they comprise only 15% of our faculty members. This subdiscipline covers the majority of the instruction in General Chemistry (CHE 140 & 141, lecture and lab) for STEM majors, as well as the non-majors GenChem courses (CHE 110/112). Often these lecture sections are filled to capacity, which means that we will need to increase the number of sections offered with any increase in enrollment (such as that anticipated with the engineering program coming on board). In addition, they must also cover the upper-level major's Inorganic courses (CHE 250, 251, 350, & 351) along with their graduate offerings. In this situation, we will be forced to choose between decreasing the frequency of offering CHE 110/112 versus graduate courses in Inorganic Chemistry. I often had similar trade-offs to deal with in Biology because we were low on faculty numbers. In these cases, the graduate students all too often are on the losing side of this trade-off. If ISU is going to remain an R2 institution with viable graduate programs, then we cannot continue to allow this to happen.

Note: When I discuss start-up packages with faculty recruits, I explain that we maintain a "communal" atmosphere where we all share access to university purchased equipment. So large items purchased with start-up funds are an investment in the Department as a whole, not only a single individual.

#2 **Biochemist** - annual salary = \$72,000.

Start-up costs will total approximately \$175,000. We are requesting \$100,000 from the College (\$70,000 in FY24; \$25,000 in FY25; \$5,000 in FY26) and Chemistry would support the remaining \$75,000 over the same three-year stretch.

Rationale: With the loss of Dr. Weitzel, we are down to two Biochemistry Faculty members. Although neither of which have discussed retirement, they have served ISU Chemistry for 23 and 37 years, respectively, so it seems that this might be something they could be considering. The Biochemistry major has averaged ~70 students/year for the last five years, which accounts for ~50% of the Chemistry Department's majors. It is unrealistic to assume that the needs of these 70 students can be accommodated by only two TT faculty members. This subdiscipline is also crucial for other entities on campus that need Biochemistry, e.g., Nursing, Nutrition, and Biological Sciences.

Objective #2: Increase Graduate Assistant budget

Requested Funding: (\$25,038; cover the loss of two GTA lines), permanent

Strategic Plan Alignment: CHE Goals 1 & 3, CAS Strategic Focus 3- Goals 1 & 2, Educate·Connect·Elevate Goal 1

Rationale: The graduate student collective bargaining resulted in a stipend increase for our students. This differential was covered by the university in FY'22 but is not budgeted to be covered in FY'23. The difference



in Chemistry's GA budget to accommodate this and next years' increases will result in decreasing our GA numbers by two graduate students. Without regaining this instructional capacity, we will lose 3-5 General Chemistry lab offerings, which will reduce CHE 140 enrollment by 72-120 students (i.e., ~\$130,000 - \$215,000 in tuition revenue).

Objective #3: Replace/upgrade Teaching Laboratory Equipment (*all are needed and would be welcomed; the order is a priority listing*).

Strategic Plan Alignment: CHE Goals 1, 2 & 3, CAS Strategic Focus 2, 3 & 4, Educate·Connect·Elevate Goal 2 & 4.

Rationale: We continue to make progress maintaining and replacing equipment that was purchased in the 1990s with absolutely no plan to maintain or replace it. The new AEF effort is a tremendous mechanism moving forward and truly the first functional forethought that has come out of ISU in my 20+ years. Unfortunately, most of the equipment in the Science Laboratory Building was purchased in 1997, so the demands are more than the AEF can accommodate (total cost is in the millions of dollars), so we continue to do our part to chip away it and ask for additional assistance from the College and University if funds are available. The most substantial equipment purchase request would be a replacement for our 400 MHz NMR, which the company says parts are no longer being made and thus will have to come off of service contract when the existing supply is depleted (~1-2 years). A new NMR would be ~\$750,000 and is heavily used in Organic Chemistry classes and by students doing independent research. Given the price tag, it may be a better target for the department to write an NSF MRI grant to acquire this equipment. I list other instructional needs below.

Below is a list of other Lab modifications and equipment items that we will be trying to acquire over the next year and would greatly appreciate any help that the College and/or University might be able to provide.

Items listed below are what we will focus on in FY23.

Funding Requested (any help appreciated):

1) Modest renovation of our General Chemistry teaching laboratories including some equipment upgrades. \$175,000. These spaces have not changed since they were built in 1997 and are looking worse for the wear. The Department (through the General Chemistry Committee) is trying to evaluate and make recommendations on updating these courses. In addition to CHE 140 being a general education course, both CHE 140 and 141 are key courses for all STEM majors and as such are extremely important in recruitment and retention. The proposed renovations will not only improve safety, but they will also make the spaces more efficient and enable us to add some additional students per section, which will be a tremendous help, especially with the Engineering College on the horizon.

Items: Install tables or shelving for chemicals (current mode of bringing bottles in on a carts poses a safety issue), Install projector and screen for content delivery, 10 work stations (equip: UV-Vis Spectrophotometer w/ laptop computer, balance, pH meter, pipets). Funding: AEF and CHE SBC/GR (Chemistry has ~\$60K to be SBC'd for part of this project, but if the other fraction is not available, we cannot hold a laboratory at 34% completion waiting for the additional resources as it would be unusable for class).

2) Gas Chromatograph and Nitrogen Generator (for high-resolution Mass Spec). \$33,000. These items are needed for our Analytical Chemistry teaching laboratories (i.e., CHE 216 & 316) as well as student independent research projects.

3) HPLC. \$41,000. Analytical and Organic Chemistry laboratories.

**Strategic Budget Carryover plans.**

Personnel: \$100,000. We are estimating SBCing this much in salary as we have not been able to replace Tony Ludwig (equip. maintenance) or Alex (stockroom asst.) since they both resigned in the Fall semester. The plan with Alex's line is to move it into the GA budget to fill this position with two 0.5 TAs (i.e. full-time GAs) to work in the stockroom and set up Gen. Chem. Labs.

IDC: \$70,000. This will get carried over for research support. A good chunk of this is within PIs' portion.

Operation/Equipment: \$125,000. We are estimating SBCing this much for equipment. We have a substantial commitment to Dr. Susil Baral's start-up (new Physical Chemist). In addition, there are some equipment items that need to be purchased. Since there isn't enough money to replace all that is needed, I would like to SBC this money so the new permanent Chair, Dr. George Barnes, can make the decision that he deems most appropriate.