ACADEMIC PROGRAM REVIEW

Fairmont State Board of Governors

☐ **Program with Special Accreditation** **X** **Program without Special Accreditation**

Date Submitted November 17, 2022

Degree Program Bachelor of Science in Chemistry

INSTITUTIONAL RECOMMENDATION Approved by the Board of Governors (§ 5.2.8)

The institution is obligated to recommend continuance or discontinuance of a program and to provide a brief rationale for its recommendation:

X 1. Continuation of the program at the current level of activity;

____ 2. Continuation of program with corrective action (for example, reducing the range of optional tracks or merging programs);

____ 3. Identification of the program for further development (for example, providing additional institutional commitment);

____ 4. Development of a cooperative program with another institution, or sharing courses, facilities, faculty, and the like;

____ 5. Discontinuation of the Program

Kayla Lacky **Signature of person preparing report**	01/12/2023 **Date**
Steven Reed **Signature of Dean**	3/31/23 **Date**
Timothy P. Ogley **Signature of Provost and Vice President for Academic Affairs**	3/31/2023 **Date**
Maureen B Phillips **Signature of President**	4/20/23 **Date**
 Signature of Chair, Board of Governors	04-24-2023 **Date**

Executive Summary for Program Review

(not to be more than 2-3 pages)

Degree Program:	Bachelor of Science in Chemistry
College or School/Department:	College of Science and Technology/Dept of Natural Science
Chair/Program Coordinator	Deb Hemler/ Kayla Lantz
External Reviewer:	Dr. Heidi Fletcher
Reviewer Email:	hfletche@waynesburg.edu

A. Synopses of significant findings, including findings of external review (include the external reviewer(s) information).

- Our graduates obtain meaningful employment or pursue additional education via graduate or professional school in the short term, and contribute to the local, regional and national economies and civic life in the long term. The value provided to graduates from the chemistry BS degree and chemistry minor is a significant program strength.

- To continue supporting recruitment and retention, we maintained approval by the American Chemical Society Committee on Professional Training (ACS CPT), which provides a mark of national excellence and a recruiting tool for well-prepared students. In addition to the infrastructure strengthening work described in Part C below, we have also worked in the past 5 years to address two additional key aspects of the ACS guidelines:
    - "An energetic and accomplished faculty"
        - We have recruited and provided support to new faculty members Dr. Kayla Lantz and Dr. Jojo Joseph (hired in 2020) and new stockroom/lab manager Carly Horner, (hired in 2021). We are currently advertising an additional faculty retirement replacement. Our new faculty are indeed energetic and accomplished, and have already become highly active in teaching, advising, mentoring, grant writing, curriculum development, and service to the institution. Chemistry program faculty foster the open communication and information sharing necessary for effective collaboration in support of student learning and success. The chemistry program provides a large and successful service role within the College of Science and Technology, the University, and the state.
    - " A coherent chemistry curriculum that incorporates modern pedagogical approaches."
        - Chemistry faculty meet regularly to plan and align the curriculum across all courses in support of effective student learning, and the flexibility in course sequencing made possible by the 2015 ACS guideline changes has continued to be helpful. All of our introductory courses have video "mini-lecture" components to aid students. The availability of this library of videos allows us to provide just-in-time review when content comes up in subsequent courses. We have moved to open resource textbooks and textbook rentals. Our courses transitioned smoothly to online environments when the institution shut down in March 2020, largely thanks to our heavy investment over the past 10 years in useful technology support for our curriculum.
- See attached external review from Heidi Fletcher. Our program is in the process of hiring a tenure-track biochemistry faculty to address her suggestion on strengthening biochemistry in our curriculum.

B. Plans for program improvement, including timeline

- Ongoing: Continue with successful aspects of our program, such as maintaining ACS approval and the strong curriculum that requires, providing early hands-on experiences and high levels of personal attention from faculty and supportive peer mentors, working collaboratively as program faculty, and paying conscious attention to student voice and concerns.
- Ongoing: Continue with rigorous coursework accompanied by strong support for students to achieve the expected learning, in collaboration with Datha and Gene Smith (Tutoring and Testing Center, peer mentors, First2 Network, and S-STEM Councils. Continue to listen to students about where the biggest challenges are, and brainstorm with them about how to address them.
- Each semester: Offer supplemental experiences to assist with recovery from the effects of the pandemic and the accompanying shutdowns, and work with current students to figure out how to incentivize participation in these experiences. Examples: (1) a chemistry mini-course to provide lab enrichment activities for students whose lab experience was affected by the pandemic. (2) Workshops to engage students in practicing how to read and interpret word problems, and how to do math with science variables.
- Chemistry faculty are ready to try a new approach in the first-year course to help attract majors. This will be led by the new faculty, who have the best understanding of how to reach the current generation of students. This year we experimented with the use of unknowns in the first-year chemistry laboratory, and also with course-based undergraduate research projects in collaboration with local chemical industries to show students that their coursework is directly relevant to getting them a career in STEM. Our ACS club is also active in outreach at local high schools to introduce them to science and make connections between high school teachers and the Chemistry Program. The club is also partaking in a career day, where local high school and middle schoolers will interact with our group and see fun chemistry demonstrations.
- 2023-2024: Work as part of the Natural Science Department and Financial Aid to find ways to support students in navigating the financial aid landscape and to put structures in place that allow students to progress in a manageable way. Currently under consideration are concentrations and/or program electives to support pre-professional students.
- Ongoing: Continue to work with the VP for Facilities and Safety to address plumbing, lighting, heating and cooling and especially the chemical fume hoods and their connection to the HVAC system. Spring/summer of 2023: Remodel the student study room on the second floor to provide a more welcoming, attractive and comfortable environment, including a kitchenette area.

C. Identify weaknesses or deficiencies from the previous review and describe how these have been addressed.
   - To continue to meet the guidelines for program approval from the American Chemical Society, we addressed the following specific recommendations from our 2018 program review:
     - Strengthen our infrastructure by improving chemical fume hood adequacy and basic physical maintenance in the laboratories.
       - Worked with Facilities to repair dysfunctional fume hoods and implement plumbing renovations, lighting updates, lab bench surface maintenance and a remodel of the stockroom to enhance security and access to shared building resources such as the ice machine. Continued infrastructure work is needed.
     - Continue to replace and update instrumentation.
       - Allocated program resources and submitted grant proposals to replace, update and expand our instrumentation holdings and to ensure infrastructure development.
     - Ensure continued access to ACS-specified journals.
       - Worked with library staff to ensure access to ACS-specified journals across a rapidly changing landscape with many journals moving to open-access.
     - Have students choose an actual major when they enter the institution.

- Worked with academic administration to remove the previous "pre-medical" major listing since students could not actually earn a degree in pre-medical studies. Entering students interested in pre-professional studies are now assigned an "Academic Pathways: Health Professions" advisor until they declare a true major.

- Continue working on recruitment and retention of qualified students as chemistry majors.
  - Recruitment, retention, and student success remained top priorities for chemistry faculty and current students. We visited schools, sent postcards, and our "Day in the Life of a Chemistry Major" video (https://youtu.be/9E6FEkvbzKI) features a current student, Josh VanSchaik and new faculty member Dr. Kayla Lantz. Chemistry faculty also have been involved as PIs and co-PIs on large National Science Foundation grants (First2 Network – $2.4 million and S-STEM – $749,693) directed at student recruitment and success.

D. Five-year trend data on graduates and majors enrolled (Data will be provided by the Director of Institutional Research and Effectiveness).

AY	*Enrollment	**Degree Awarded
2021-22	19	1
2020-21	22	4
2019-20	32	4
2018-19	38	7
2017-18	31	4
5-YR AVG	28.4	4

HEPC Series 10

Productivity Standards Programs are required to meet at least one of the indicators listed below.

Average of Five Most Recent Years

Degree Level	*Enrollment	**Degree Awarded
Baccalaureate	28.4	4
Masters	N/A	N/A

* Official fall end of term headcount

** IPEDS Graduation data (July 1 - June 30)

E. Summary of assessment model and how results are used for program improvement (A full Assessment Report is in TaskStream and can be downloaded or viewed by academic year for summation).

- Assessments, improvements and modifications are designed to improve student learning success and to maintain our program within the guidelines for continued approval by the ACS. Program and course outcomes are specified in TaskStream along with measures, performance standards and findings. Program faculty meet during professional development weeks to review findings and plan needed adjustments. One example is the implementation of a new prerequisite for Chem 2205, along with supplemental videos to provide review of topics from first-year chemistry courses.

F. Data on student placement (e.g., number of students employed in positions related to the field of study or pursuing advanced degrees).

- The chemistry program maintains a near-100% placement rate for program graduates in employment or graduate/professional school within a year of graduation. During the past 5 years, 55% of graduates are employed and 45% are in graduate or professional schools. Students create resumes and cover letters in the first-year chemistry course, and update them in subsequent courses. In Chem 4412, they participate in mock interviews organized by chemistry faculty in collaboration with Career Services. Students are encouraged to work with faculty and peers to undertake research experiences and other professional activities such as travel to professional meetings, grant writing, and outreach to high schools.