# FALL 2024 SCIENTIFIC PRINCIPLES ASSESSMENT RESULTS (HENRIETTA)

## Outcome: Apply methods of scientific inquiry and problem solving to contemporary issues and scientific questions

**Benchmark:** 70% of students will achieve a rubric score of Competent (3) or higher

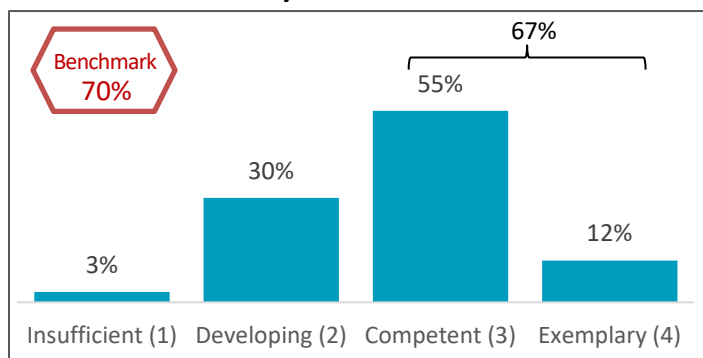**Courses:** BIOL 101, BIOL 123, BIOG 101, ESHS 210, ESHS 370, NSCI 161, PUBL 301

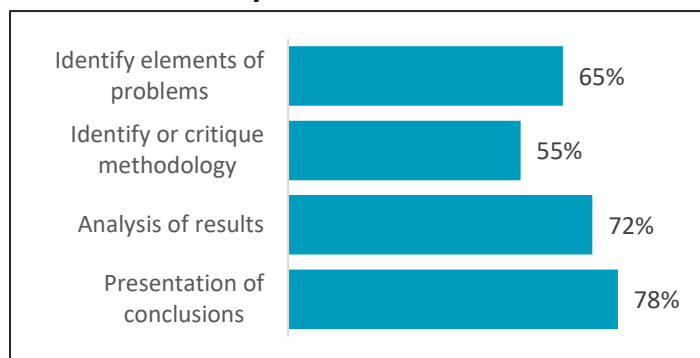**Number of Students Assessed:** 608

**Key Findings:**
- Benchmark Not Met
- 67% of students achieved a rubric score of Competent (3) or higher

**Next University Assessment:** Fall 2028 (with focused fall 2026 reassessment)
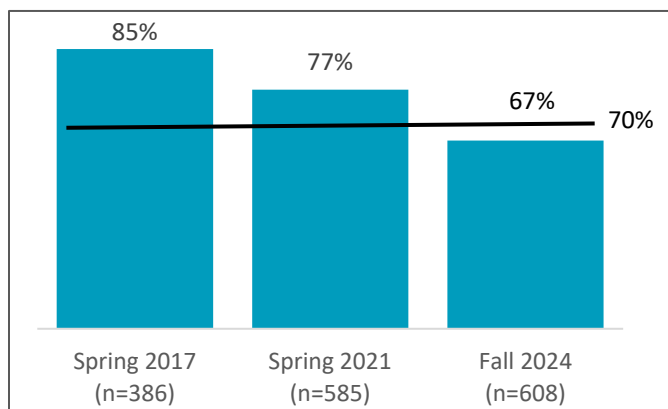
## Fall 2024 Results by Rubric Score



## Fall 2024 Results by Rubric Criteria



## Fall 2024 Trend Results



**Findings:** The benchmark was not met in this assessment with 67% of students scoring a Competent (3) or higher on the rubric. Results were analyzed by rubric criteria and scores were above the benchmark for the criteria *Analysis of results* and *Presentation of conclusions*. This is the third time this outcome has been assessed since the benchmark was revised from 50% to 70% scoring a Competent (3) or higher. The percentage of students meeting the benchmark decreased by ten percent from 2021 to 2024. The faculty teaching the courses that did not meet the benchmark are implementing several changes to instruction, assignment design, and student support. A follow-up assessment will be conducted to determine whether the changes were successful.

Faculty were asked to provide examples of how results were/will be used to improve learning outcomes in their courses as well as how to use results from this assessment at the university level and department level. Examples follow:

### Table 1: Faculty Recommended Use of Results for Continuous Improvement

| Recommendation or Use of Results | Action Item/Next Step |
|---|---|
| **Course Level**<br>**BIOL 101**<br><br>• Conduct workshops on problem identification that break down real-world problems into smaller elements; provide case studies or sample scenarios relevant to biology for practice.<br>• Develop templates for students to systematically identify and document the components of a scientific problem. | ✓ Faculty to implement course level changes in all courses listed |

- Align the project rubric more closely to the general education criteria, providing additional clarity for students on specific requirements for the project.
- Refine instruction on interpreting data using these potential approaches:
  - Methodology Review Sessions: incorporate class activities where students critique sample methodologies to practice evaluating strengths, weaknesses, and relevance.
  - Rubrics and Examples: provide rubrics with examples of excellent and poor methodologies to guide students' understanding.
  - Collaborative Discussions: encourage group discussions where students critique each other's proposed methodologies, fostering peer-to-peer learning.
  - Data Analysis Tutorials: offer hands-on tutorials focusing on interpreting graphs, statistical tests, and other data representation methods relevant to biology.
  - Practice Assignments: create smaller assignments throughout the semester that require students to analyze sample data sets and provide interpretations.
  - Step-by-Step Guides: provide guides on common analytical methods, highlighting steps to draw scientifically valid conclusions.
- Strengthen presentations of conclusions to elevate performance including:
  - Presentation Workshops: organize sessions on effective scientific communication, focusing on clarity, visual aids, and tailoring messages to diverse audiences.
  - Peer Review of Presentations: have students present drafts of their conclusions to classmates for constructive feedback.
  - Exemplars: share recorded examples of high-quality scientific presentations to inspire and set benchmarks.

**BIOG 101**
- Provide additional clarity for students on the specific requirements for each section of the project that is being evaluated by revising the rubric to include more specific requirements.
- Provide students with sample projects or templates to utilize as a source of reference.

**ESHS 210**
- Provide additional instruction during the debate preparation portions of the semester. Students scored well in identification of elements of the problems presented and presentation of conclusions. Students did less well in articulating their analysis.

**ESHS 370**
- Emphasize how to analyze qualitative and quantitative results from research papers and to make appropriate conclusions based on what was written in the paper as well as how to articulate findings in writing.

**NSCI 161**
- Align course content more closely with the general ed perspective criteria. This rubric helps me to think about how I can restructure lab reports in the future, and change the type of lab activities I use.

**PUBL 301**
- Introduce a module on policy evaluation that emphasizes the identification and interpretation of empirical evidence. Most students

demonstrated competence in researching policy backgrounds and discussing the rationales and goals of policies, many struggled to identify appropriate literature or relevant studies/reports that assess policy effects and effectiveness.
- Schedule one-on-one meetings with students to guide them in finding relevant literature and to discuss these studies in depth. This personalized approach will provide tailored support, helping students overcome specific challenges they face in their research.

**Department Level**

**BIOLOGY**
- Program Level Recommendations:
  1. Standardized Assessment Rubrics: implement program-wide rubrics aligned with course outcomes to ensure consistent expectations and feedback.
  2. Capstone or Scaffolded Projects: introduce scaffolded projects across courses to progressively build problem identification, methodological critique, and communication skills.
- Course Level Recommendations:
  1. Embedded Skill-Building Activities: incorporate weekly activities focusing on each criterion (e.g., identifying problems, analyzing data, presenting conclusions).
  2. Frequent Feedback Opportunities: provide multiple low-stakes checkpoints to review student work and offer guidance for improvement.
  3. Interdisciplinary Modules: partner with other courses (e.g., communication or statistics) to reinforce skills like data analysis and scientific presentation

✓ Share results with the Biology department

**University Level**

**WRITING AND WRITING SUPPORT**
- Revisit the structure and focus of writing courses. It is critical to equip students with skills in scientific and objective writing that emphasize identifying facts, analyzing research evidence, and constructing evidence-based arguments.
- Ensure that a university-level writing course incorporates modules on research-based writing, teaching students how to critically evaluate sources, synthesize information from scholarly studies, and present findings in a clear, structured, and objective manner.
- Integrating assignments that simulate real-world writing tasks such as policy briefs, research reports, or evidence-based essay can help students develop practical skills in professional communication.
- Enhanced Support Services: provide institutional support through the writing center with resources specifically tailored to STEM students.

✓ Share results with COS, GEC, the Gen Ed Revision Task Force, CTL, and the UWC/UWP

**FACULTY PROFESSIONAL DEVELOPMENT**
- Organize Faculty Development Programs such as workshops to train instructors on integrating targeted support for scientific reasoning, data analysis, and presentation skills into their curriculum.

**INFORMATION LITERACY**
- This learning outcome is really about critical thinking and getting students to evaluate information and data that they come across throughout their

studies and their everyday life. The university needs to promote information literacy (being able to tell what is true and what is not true in all forms of media). Problem solving should always involve seeking additional input, and students need to be able to determine if the input is valid.

- For my students in this class, the analysis category rated the lowest. I think students struggle the most with putting information into context and understanding its limitations. Too often, I see students relying on one source for critical information or applying information without regard to context or the assumptions made when the information was produced.

**STUDENT SUPPORT**

- Colleges and/or university advertise some of the Academic Success Center's offering. Students are not fully aware of the resources they have access to outside of their instructor for assistance with course related projects, papers, etc.

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**Thank you to the RIT Henrietta faculty members who participated in the fall 2024 General Education assessment!**

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