students draw chemical structures of biological and organic molecules, write/draw these structures using visualization tools.

- **Institutional Outcome**
  - students work on an individual "myIDP" which is a science career development plan, consisting of goals, knowledge, and skills for career success.

- **Evidence**
  - Evidence for this item is contained in the Second Exam written proposal and oral presentation based upon individual knowledge base of the relevant science; the proposal document is then read by the thesis committee that includes hypotheses, specific aims, background, preliminary data, and experimental design. The proposal document is then reviewed by the thesis committee members, and the student is required to answer the oral examination based on the written proposal and oral presentation.

- **Related Coursework and Other Learning Opportunities**
  - On-line and/or workshop training to earn certificate in Responsible Conduct of Research (CITI) and professional ethics.
  - Students prepare presentations on selected topics chosen from current journal articles including the results of experimental findings presented as one data from analysis instruments, graphs, tables, photographs and other visualization tools.

- **Evidence**
  - Publications from the current literature are critiques; students analyze modern biochemistry in information from current journal articles including the results of experimental findings presented as one data from analysis instruments, graphs, tables, photographs and other visualization tools.

- **Professional Ethics**
  - A grounding in original contribution in one's discipline as required.

- **Evidence**
  - Students prepare a proposal for the completion of the doctoral thesis that includes hypotheses, specific aims, background, preliminary data, and experimental design. The proposal document is then reviewed by the thesis committee members, and the student is required to answer exam questions in "essay" form for assessment of the items included above.

- **Broad and Specialized Knowledge**
  - A substantial and original contribution in one's field.

- **Evidence**
  - Quizzes, mid-term and final Exams; First Level Exam; Advanced Biochemistry I, II 71010, 71020

- **Oral and Written Communication**
  - A substantial and original contribution in one's field.

- **Evidence**
  - Seminar in Biochemistry 72010, 72020

- **The Ability to Analyze, Synthesize, and Evaluate Information Obtained in Experimental Approaches in Laboratory Research**
  - A substantial and original contribution in one's field.

- **Evidence**
  - Basic Seminars in Biochemistry 72010, 72020; Second Exam written and oral components; Dissertation oral and defense

- **Mastery of the Skills and Concepts Necessary for the Ethical Conduct of Research**
  - A substantial and original contribution in one's field.

- **Evidence**
  - On-line and/or workshop training to earn certificate in Responsible Conduct of Research (CITI) and professional ethics.

- **Comprehensive Knowledge about Careers in Academia and the Chemical/Pharmaceutical Industries**
  - A substantial and original contribution in one's field.

- **Evidence**
  - Students attend an annual Career Day event during which their CV is critiqued for improvement; students participate in grant writing exercises; students attend an annual Career Day event; review of drafts of grant proposals (students learn this information from experienced faculty, workshop leaders, alumni. Students gain fundamental facts about grantsmanship)