







**Analysis:**

demonstrating lab competence.

|         |    |    |           |    |           |
|---------|----|----|-----------|----|-----------|
| Sp 2016 | 23 | 14 | <b>61</b> | 20 | <b>87</b> |
| Sp 2017 | 19 | 14 | <b>74</b> | 17 | <b>89</b> |

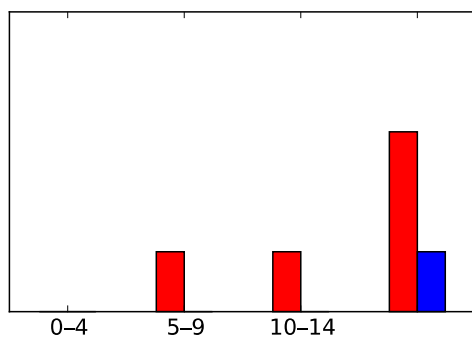
### Advanced Inorganic Chemistry

#### CHEM 4162 Winter 2017

**Chemistry PLO #1:** demonstrate knowledge in the various areas of chemistry, including inorganic chemistry, analytical chemistry, organic chemistry, physical chemistry, and biochemistry.

**Assessment Tool:** Several specific learning outcomes are assessed using embedded questions in the final exam. The learning outcomes and the corresponding distribution of scores are shown below, broken down by degree program (red is B.S. Chemistry, blue is M.S. Chemistry). The total course enrollment is 6 students: 5 B.S. Chemistry and 1 M.S. Chemistry.

*Learning outcome: Illustrate and classify the structures of coordination complexes.*



**Plans:** In the Winter 2017 quarter, we incorporated the regular use of in-class, active, cooperative learning activities. For the next year, we plan to further develop and improve upon these in-class activities. In addition, we will also develop and introduce a new module on nanoscale materials in order to comply with the most recent (2015) requirements for the American Chemical Society (ACS) degree certification.

4. Calculate third-law entropies from experimental data.
5. Relate thermochemical properties to chemical systems at equilibrium.
6. Synthesize and utilize quantitative descriptions of phase equilibrium.

Questions (1-4, 7-10, 14, and 15) were embedded into the final. Taken together, these questions touch on SLOs 1, 2, 5, and 6.

The questions map to the SLOs according to the following table:

| Question\SLO | 1 | 2 | 3 | 4 | 5 | 6 |
|--------------|---|---|---|---|---|---|
| 1            |   |   |   |   |   |   |



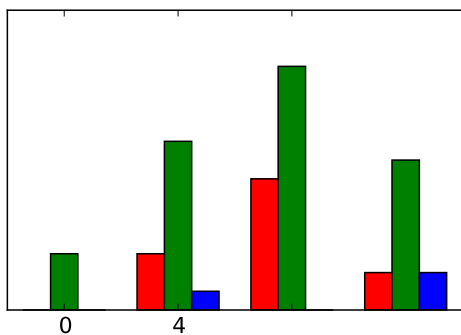


Table 5 – BS Chemistry (11 students)

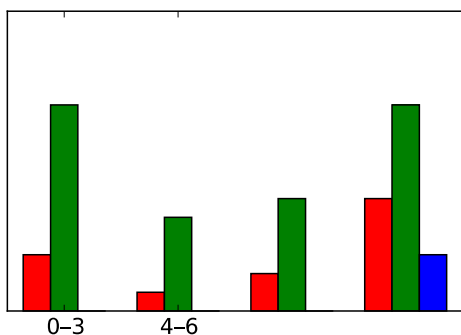
| Question | Number (Percent) of students receiving at least |     |     |      |
|----------|---|-----|-----|------|
|          | 25%   | 50% | 75% | 100% |

Several specific learning outcomes are assessed using embedded questions in the final exam. The learning outcomes and the corresponding distribution of scores are shown below, broken down by degree program (red is B.S. Chemistry, green is B.S. Biochemistry, blue is M.S. Chemistry).

***Learning outcome:*** Formulate the mathematical description for the quantum mechanical motion of a particle.



***Learning outcome:*** Model the vibrational and rotational motion of molecules.





Final Q5