**Graduate Degree Learning Outcomes**

Department of Chemistry and Biochemistry

December 2018

**Ph.D. Program**

1. Acquire in-depth knowledge in a subfield of chemistry

Students will acquire this knowledge by doing advanced course work in the field, reading scientific papers, performing original research in the lab, and passing an advancement exam in the student’s research area.

2. Acquire breadth of knowledge in other subfields of chemistry

Students will acquire this knowledge by doing course work and taking cumulative exams. It is specifically noted that biochemistry students are required to become proficient in genetics.

3. Learn how to carry out independent chemistry research

Students will learn:

## literature comprehension skills

## how to formulate scientific hypotheses

## how to make rapid research progress

the scientific method and research design

data gathering and interpretation

how to see where a field of research is heading in the future

to place one’s research in context of the field

how to write a research proposal

how to write technical research reports

proper citing and referencing techniques and methods

communication of research results through scientific publications and presentations

how to think on one’s feet while presenting a seminar and asked a probing question

how to pursue a research problem to a point culminating in a written thesis that makes a significant and original contribution to the understanding of chemistry

4. Acquire professional development skills and knowledge

Students will:

attend professional meetings and make oral or poster presentations

learn how to get internships in governmental labs, in industry, or in teaching

learn how to teach

learn softskills: leadership, problem-solving, teamwork, communications

5. Acquire an understanding and awareness of professional, ethical and safety applications of their knowledge

Students will:

develop and understand the ethical and social dimension of science and the role and responsibility of chemistry for the advancement of the society

learn and put into practice the expectations of responsible conduct in the professional field

participate in professional meetings and workshops

learn about laboratory safety and best safety practices

**Master’s Program**

1. Acquire additional knowledge in a main subfield of chemistry

Students will acquire this knowledge by doing advanced course work in the field, reading scientific papers, and optionally performing original research in the lab.

2. Students doing a research master’s will learn how to carry out independent chemistry research

Students will learn or be exposed to:

## literature comprehension skills

## how to formulate scientific hypotheses

## how to make rapid research progress

the scientific method and research design

data gathering and interpretation

how to see where a field of research is heading in the future

to place one’s research in context of the field

how to write a research proposal

learn to write technical research reports

proper citing and referencing techniques and methods

communication of research results through scientific publications and presentations

how to think on one’s feet while presenting a seminar and asked a probing question

how to pursue a research problem to a point culminating in a written thesis that makes a significant and original contribution to the understanding of chemistry

3. Acquire professional development skills and knowledge

Students will:

attend professional meetings and make oral or poster presentations

learn how to get internships in governmental labs, in industry, or in teaching

learn how to teach

learn softskills: leadership, problem-solving, teamwork, communications

4. Acquire an understanding and awareness of professional, ethical and safety applications of their knowledge

Students will:

develop and understand the ethical and social dimension of science and the role and responsibility of chemistry for the advancement of the society

learn and put into practice the expectations of responsible conduct in the professional field

learn about laboratory safety and best safety practices if they are doing a research Master’s