MCS New Course Proposal Form

Course Title: Chemistry Tech I to Lab I Transition

Instructors: Karen Stump

Course Number: 09-215        Cross Listing: NA

Prerequisites/Corequisites: 09-207 Techniques in Quantitative Analysis

Semesters Offered:

☑ Fall  ☑ Spring  □ Summer-All  □ Summer 1  □ Summer 2

Semester Length:

□ Mini 1  □ Mini 2  □ Mini 3  □ Mini 4  ☑ Full Semester

Course Offering Frequency: as needed

Suggested Days and Times: course will be mainly independent study with occasional meetings between the instructor and the student

Course Evaluation type: ☑ Letter Grade  □ Pass/Fail

Course Unit Justification: Total Units 3

In Class Hours: Click here to enter text. Recitation Hours: Click here to enter text.

Lab Hours: Click here to enter text. Out of Class Hours: 45 hours per semester to be distributed at the student’s discretion

Target Population: Students who completed 09-207, Techniques in Quantitative Analysis, instead of 09-221, Laboratory I: Introduction to Chemical Analysis and wish to declare a primary or additional major in chemistry (09-207 will be accepted for the minor in chemistry).

Anticipated Enrollment: 1-2 students per semester.

Rationale for Course (Background): In the past, 09-221, which is required for the chemistry primary and additional major, was the only entry level lab course to the four course lab sequence required for the BS and additional major in chemistry. It was taken by students majoring in chemistry, biological sciences and chemical engineering as well as students from other majors wishing to seek further education in order to enter careers in the health professions. Starting in the fall semester of 2016 students majoring in biological sciences will
take 09-207, a 9 unit lab class approved by college council in the spring of 2015. 09-215 is being proposed in order to accommodate students who take 09-207 but who later wish to declare a chemistry major. This 3-unit course is intended to fill in some of the gaps in knowledge and experience that these students might have in not having taken 09-221. We recognize that this can’t replace the 09-221 experience but hopefully will address some deficits while also allowing the student flexibility in where this course is placed within the curriculum.

Special Facilities Needed: none

Textbooks and/or Other Materials: Will rely on whatever text is currently used in 09-221. At present that is Exploring Chemical Analysis, 5th edition by Daniel Harris. Students will also need to purchase access to the online Sapling Learning module relevant to the course content.

Assessment: The content will focus on 2 areas: topics in quantitative analysis that are emphasized in 09-221 but not covered or covered in insufficient depth in 09-207 and additional aspects of the team project experience that are no longer fully developed in 09-207. Assessment of content areas will be through assigned problem solving and some kind of final assessment that bridges the concepts and the team project development aspect (similar to some of content of a typical 09-221 final). I hope to use the Sapling Learning online resources in the area of analytical chemistry and quantitative analysis. Students will be required to correctly solve problems assigned and be assessed on the number of attempts required to do so. In addition students will be required to plan a team project and present their ideas in an oral and written format. The oral presentation will be recorded and evaluated by the instructor and student. Project development will include all the stages that an 09-221 student completes with the exception of the actual lab work. These include: development of a suitable question working within the constraints applied by the instructor; research of at least two analytical methods suitable for data collection in order to answer the proposed question; development of the methods into specific procedural protocols which includes emphasis on preparing complex samples for analysis and eliminating potential interferences; and preparation of a detailed hazard analysis. Assessment of the project component will be with written work products and an oral presentation to the instructor. The 3 units will be divided as approximately 20 hours on content oriented questions, 20 hours on team project work and 5 hours on preparation, presentation and review of their talk.

Topics Covered: This will be determined by the specific content of the current version of 09-221 being taught that semester. While the techniques utilized are fairly consistent from one semester to the next, the specific experiments that students perform change significantly every two years. The instructor will make an assessment of the most relevant chapters from the 09-221 textbook and from that an assignment of suitable problems to reinforce the concepts. As an example in the 2014-2016 version of 09-221 important concepts and questions would be
drawn from the following chapters of the Harris text: Chapter 1 (Chemical Measurements), Chapter 2 (Tools of the Trade), Chapter 3 (Math Toolkit), Chapter 4 (Statistics), Chapter 6 (Good Titrations), Chapter 7 (Gravimetric Analysis), Chapter 8 (Introducing Acids and Bases), Chapter 9 (Buffers), Chapter 10 (Acid Base Titrations), Chapter 11 (polyprotic Acids and Bases), Chapter 13 (EDTA Titrations), Chapter 18 (let There Be Light), Chapter 19 (Spectrophotometry: Instruments and Applications), Chapter 20 (Atomic Spectroscopy), Chapter 22 (Gas and Liquid Chromatography). Since 09-207 has not been taught yet, the relative emphasis within each chapter is to be determined.

Course Catalog Description: 09-215 is a 3-unit course intended for students who have taken 09-207, Techniques in Quantitative Analysys, who decide later in their academic experience that they wish to pursue a degree or an additional major in chemistry. The chemistry major requires a 12-unit lab class, 09-221 Laboratory I: Introduction to Chemical Analysis. This course will utilize self-study and problem solving to introduce or reinforce key concepts covered in 09-221 that are not introduced or are de-emphasized in 09-207. Students will also propose an idea for an independent lab-based project and carry it through all stages of development but not perform the actual lab work. The project development will require written work products as well as an oral presentation. The course must be completed before the last semester of the student’s degree program.

Learning Objectives: Students will: gain a more robust understanding of the chemical principles that underpin the basic wet chemical and instrumental methods important in basic quantitative analysis; develop a deeper understanding of the steps required to move a lab-based project involving real-world samples (as opposed to single component quantitative unknowns) from inception up to but not including lab work; gain a better understanding of the goals of a technical talk in their discipline, practice in developing the talk including preparation of effective visual aids and refinement of the skills necessary to accomplish their goals in an effective manner.

Departmental Approval Date: Approved unanimously 4/20/16 faculty meeting.

CUA Recommendation Date: Click here to enter text.

College Council Approval Date: Click here to enter text.

Date Sent to Enrollment Services: Click here to enter text.

Comments: It is too premature to prepare a syllabus at this time as 09-207 has not been taught yet. While we have a general idea about the differences between the two classes, I think
making informed decisions about specific points of emphasis for 09-215 will require at least one run through of 09-207, which will occur in the fall 2016 semester. 09-215 would not be offered before the spring 2017 semester.

* Please attach a copy of the proposed syllabus