



CAMPBELLSVILLE UNIVERSITY

COURSE SYLLABUS

PLEASE TYPE.

DATE 20 December 2016

ACADEMIC UNIT Natural Science Division FACULTY Elizabeth K. Sutton

Discipline	Course # and Section	Title of Course	Credit Hours	Cross Reference (if applicable)
CHE	315-01	Research Methods	1	n/a

TEXTBOOK Required Not Required

Author Beal and Trimbur Title "A Short Guide to Writing About Chemistry, 2nd ed.

Publisher Pearson Education Date of Publication 2001

WORKBOOK Required Not Required

Author _____ Title _____

Publisher _____ Date of Publication _____

PLEASE ANSWER THE FOLLOWING QUESTIONS ON A SEPARATE SHEET OF PAPER AND ATTACH TO THIS FORM.

- DESCRIPTION OF COURSE: Develop a brief description of the course as it will appear in the Catalog.
- STUDENT LEARNING OBJECTIVES: List the student learning objectives for the course. Please relate these objectives to the mission and goals of the University and the Academic Unit. For general education courses, please indicate which student learning objectives address general education goals and the intended method of assessment. A minimum of four of the seven general education goals must be included.

Example: Students will demonstrate their ability to compare and contrast two types of basket weaving. (Goal: Oral and Written Communication; Evidence: research paper and class presentation)

- COURSE OUTLINE: Outline the topics/units that are to be taught.
- EVALUATION: How do you plan to determine the grade in the course? Please include grading scale.
- REQUIREMENTS:
 - Examinations: State when tests are to be administered, including unit, mid-term, and final examinations.
 - Reports: How many, length required, and what type (Oral, term and/or research, book critiques).
 - Supplemental reading assignments or outside work required.
 - Supplemental instruction aids: Audio visual aids, field trips, guest speakers, etc.

6. BOOKLIST

DEAN Date Copy Received _____

VICE PRESIDENT FOR ACADEMIC AFFAIRS Date Copy Received _____

I. TITLE: CHE 315 *Research Methods*, one credit hour

II. COURSE DESCRIPTION: An overview of methods used in the collection, analysis, interpretation, and presentation of scientific data. Experimental design, literature search techniques, statistical treatment of data, preparation of figures and tables, scientific writing, and oral presentation will be covered. One lecture/recitation and one 100-minute laboratory per week. Majors should enroll in CHE 315 during their second year of study.

III. TEXT: *A Short Guide to Writing about Chemistry*, 2nd Ed. (Beal and Trimbur), Pearson Education. 2001.

IV. COURSE OBJECTIVES:

- A. **General Education Curriculum Objectives (GECO):** (numbered to correspond to the objectives listed in the University catalog.)
2. Critical Thinking: Students will demonstrate the ability to reflect on theories and issues in a systematic fashion.
 4. Ethics: Students will demonstrate an understanding of Christian values and ethical standards in order to make mature and informed decisions concerning moral issues.
 5. Oral and Written Communication: Students will demonstrate the ability to express ideas, beliefs, and information in an organized, precise, and persuasive manner.
 6. Quantitative Literacy: Students will demonstrate the ability to understand and utilize mathematical and/or logical relationships to analyze data, to construct and assess arguments, and to make sound judgments in quantitative situations that arise in daily life.
 7. Social Responsibility and Citizenship: Students will demonstrate an understanding of personal and social responsibility in a changing global environment so that students can make contributions to their respective discipline and to society as a whole.
- B. **Student Learning Outcomes (SLO):** Students will demonstrate their laboratory skills and problem solving ability in this course. (Numbered to correspond to the pertinent General Education Curriculum Objective [GECO]). By the completion of this course, students will have:
1. Learned the most appropriate methods of data collection and dissemination in the field of chemistry. (GECO 2,5,6; Evidence: homework assignments)
 2. Learned how to conduct effective scientific literature searches and how to develop of useful library of referenced work for presentation of scientific knowledge. (GECO 2,5; Evidence: literature search assignment, abstract assignment)
 3. Demonstrated the ability to formulate hypotheses and design and carry out experiments to test these hypotheses. (GECO 2; Evidence: In-Class activities, assignments)
 4. Developed their critical thinking skills as demonstrated by participation in classroom discussions/activities. (GECO 2; Evidence: In-Class activities, assignments)
 5. Developed their skills at oral and written communication by actual experiences gained in the course
 6. Students will follow ethical practices when conducting research, writing reports, using sources and when working with others. (GECO 4; Evidence: ethics assignment)
 7. Students should be able to read, understand, and apply scientific information through thinking more critically, discussing more meaningfully, arguing more persuasively, and writing more effectively. (GECO 2,5; Evidence: literature search assignment, abstract assignment)
- C. **Program Learning Outcomes (PLO):** (numbered to correspond to the listing in the program assessment document)
4. The student will be able to articulate chemical information/data/ideas clearly and effectively in speech and in writing in an acceptable presentation format.
 6. The student will demonstrate critical thinking skills in chemistry: interpretation, evaluation, explanation, and critical inquiry; how to ask appropriate questions, gather relevant information efficiently and creatively, and reason logically from this information to make reliable conclusions.

D. **Course Specific Objectives (CSO):** The primary objective of this course is to provide the student an overview of the research process.

a. Research Process Skills

Students will

1. define a research question, design question, or hypothesis for their project.
2. find and evaluate relevant primary literature and background information related to their project.
3. design experiments to test their hypothesis.
4. learn the techniques needed to do their experiments.
5. learn and follow appropriate protocols for documenting their research.
6. analyze their experimental data.
7. use logic and evidence to build arguments and draw conclusions about their data.
8. define future research questions.

b. Communication

Students will

1. explain the focus of their group's research, how individual research group members and projects are connected, and how the research in their group contributes new knowledge in their discipline.
2. connect their research to issues relevant to society at large.
3. effectively communicate their research findings in oral and written scientific formats.
4. connect their research experience to what they have learned in courses.

c. Professional Development

Students will

1. establish and maintain a positive relationship with their mentor by agreeing on common goals and expectations for the research experience, and revisit those goals and expectations regularly.
2. define their roles and responsibilities as a member of their research group.
3. define and contribute to discussions about the forms and consequences of scientific misconduct.
4. contribute to peer review in the learning community and explain the role of peer review in science.
5. identify research career options in their discipline.

V. **COURSE OUTLINE**

See tentative course schedule.

VI. **COURSE EVALUATION:**

Exams	100 pts
Homework Assignments	200 pts
In-class Activities	150 pts
Literature Article Critiques	50 pts
Seminar Critiques	50 pts
Journal	100 pts
Short Oral Presentations	50 pts
Written Research Proposal	200 pts
Research Proposal Presentation	100 pts
TOTAL	1000 pts

If, for any reason, you cannot continue to attend this class, be certain that you **DROP IT OFFICIALLY**. Otherwise you will automatically receive a failing grade.

A missed event can be made up at the discretion of the Professor. Activities required to make-up missed events will be decided by the Professor in consultation with the student. Missing more than two of the events will result in zero points for all missed events with no option for make-up. **Assignments turned in after the deadline will have 2 points deducted for the first day that it is late, with 2 points deducted each additional day that it is late (including weekends).**

<i>The total numbers of points needed to attain a certain grade are as follows:</i>		
A	850.0 points	(85.0%)
B	750.0 points	(75.0%)
C	650.0 points	(65.0%)
D	600.0 points	(60.0%)
F	Below 600.0 points	(< 60.0%)

VII. COURSE REQUIREMENTS:

A. **Attendance:** The attendance policy of the University will be strictly enforced in this class.

B. **Numbers to Remember:**

1. **Campus Security Cell Phone: 270-403-3611**
2. **Campus Security Office Phone: 270-789-5556**
3. **Natural Science Office: 270-789-5065**

C. **Classroom Behavior:**

1. Guests are only allowed in class at the discretion of and with prior approval from the instructor.
2. Electronic recording devices of any kind are not permitted except in special circumstances and with the specific permission of the instructor.
3. While you are expected to attend and participate in this class, your cell phone, computer, and MP3 players are **not**. Pagers, cell phones, and similar items are disruptive to the entire class and **must be returned off** during class. **The owner of any such device that activates during class will be immediately excused from class and counted as absent for the entire period.**
4. Use of cell phones, computers, and MP3 players during examinations and quizzes will be considered academic dishonesty, which will result in a zero being awarded for the quiz or examination (No exceptions!).
5. Hats and caps are to be removed prior to entering the classroom.
6. Take care of any physiological needs *before* coming into the classroom.
7. Unacceptable student behaviors:
 - a. Sleeping during class
 - b. Chronic tardiness. Be here ready to learn when class begins.
 - c. Reading, studying or working on materials for other classes.
 - d. Chatting with your classmates when the instructor or other classmates are speaking.
 - e. Prematurely packing up your books and bags before class has been dismissed.

D. **Academic Misconduct:** Students in this course will be working toward mastery of the material to satisfy the course objectives. This class is held to an honor system, meaning the cheating, allowing someone to cheat, or failing to report known cases of cheating are all considered academic misconduct. The Division of Natural Science Academic Integrity Policy will be followed in this class. Be aware that aggressive methods are used to protect the majority of you who are honest. For information about plagiarism and how to avoid it, consult the following website: <http://www.indiana.edu/~academy/firstprinciples>. Students will be asked to sign an integrity statement on each examination and quiz. The following statement reads as follows:

“I pledge on my honor that on this assignment/examination/quiz I have not received, given or seen any dishonest work.”

Signature _____ Date _____

- E. **Examinations:** Two written examinations (50 points each) will be given during the course of the semester, with the firm exam dates being announced in class approximately a week in advance. Exams are expected to be taken at scheduled times, all make-up exam requests will be handled on a case-by-case basis. Exams missed for justifiable reasons (illness, surgery, etc.) must be properly documented and reported to the instructor **in advance**. If advance notification is not possible, contact should be made as soon as possible. Traffic, car problems, etc. are not acceptable excuses. In the rare instance of a justifiable missed exam, a make-up exam will be provided at the discretion of the instructor. If the University is closed on an Exam day, the Exam will be rescheduled.
- F. **Reading:** There will be a significant amount of reading required for this course. Frequently, the reading assignments will be handouts or resources assigned by the instructor. Students will be expected to read,

- analyze, and critique the scientific literature. This means you'll have access and read peer-reviewed journal articles. It will be absolutely necessary to keep up with the assigned reading during the semester.
- G. **Literature Searches:** Early in the semester, students will receive instruction on literature search techniques and tools, with time allotted in class to begin with a brief practice exercise. It will be necessary for students to continue with multiple literature inquiries throughout the semester.
 - H. **Seminar Attendance:** The chemistry department has introduced a seminar attendance policy in each of its courses. Each student in a chemistry course is required to attend a certain number of natural science seminars. The actual number is determined by the course instructor. **For this course you will be expected to attend two (2) natural science seminars this semester.** Be sure that your attendance at the seminar is recorded. After attending the seminar, you will write and turn in a one-page typewritten critique/summary of the seminar. The format of the critique/summary will be discussed in lecture. Each seminar will count as a part of your homework grade (25 points each).
 - I. **Writing:** As all scientists are well aware, the ability to communicate in written form is an essential skill for success in any scientific discipline. This is especially true in the field of chemistry. Therefore, to help you hone your skills at this craft, each student will be responsible for several writing assignments during the course. Of particular importance is the Research Proposal, which each student **MUST** complete and receive a grade of "C" or better on in order to pass the course. Details will be provided during the first class session.
 - J. **Journal:** Students will keep a learning journal during the semester. This journal will include observations, notes, and other relevant materials. More details will be given during the first class meeting.
 - K. **Presentations:** Students will receive instruction on the effective presentation of information and how to lead a scientific discourse. Attendance at Science Division seminars and interaction with invited speakers will also give students useful examples on how to present scientific research. During the semester, each student will give two short (8-10 minute) oral presentations over a journal article from the literature. Each student will also give a semi-formal 10-15 minute oral presentation relating to their literature topic at the end of the semester.
 - L. **Teaching Methods:** Students will be taught concepts, applications and problem-solving techniques throughout the lecture, demonstrations and in-class discussion will also be incorporated.

VIII. BOOK LIST

- A. The ACS Style Guide: Effective Communication of Scientific Information (Anne M. Coghill and Lorin R. Garson, eds.)
- B. *Nontraditional Careers for Chemists* (Lisa M. Balbes)
- C. *Research Methods-the Basics*, Nicholas Walliman, 2011.
- C. Students are urged to purchase a copy of the book *Elements of Style*, Strunk and White, 4th edition and *The ACSACS Style Guide: A Manual for Authors and Editors*, Dodd editor.

IX. DISABILITIES

Campbellsville University is committed to reasonable accommodations for students who have documented physical and learning disabilities, as well as medical and emotional conditions. If you have a documented disability or condition of this nature, you may be eligible for disability services. Documentation must be from a licensed professional and current in terms of assessment. Please contact the Coordinator of Disability Services at 270-789-5192 to inquire about services.

X. ACADEMIC SUPPORT

The Academic Support area, located in the Badgett Academic Support Center (BASC), exists to help students. At certain times, most students need some help with studying, choosing a career, major/minor, or assistance in difficult courses. The following services are available Career Services, Disability Services, tutoring, and the Citizens Bank & Trust Writing Center. These services are provided at no extra cost to the student. Space is also available for individual and group study, and laptop computers are available for students to check-out and use within the building. Information about these services is accessible at the University website at: <http://www.campbellsville.edu>. Information is also available by calling the Office of Academic Support at 270-789-5064.

XI. TITLE IX

Campbellsville University and its faculty are committed to assuring a safe and productive environment for all students. In order to meet this commitment and to comply with Title IX of the Education Amendments of 1972 faculty members, to report incidents of sexual misconduct shared by students to the University's Title IX Coordinator.

Title IX Coordinator:

Terry VanMeter

1 University Drive

UPO Box 944

Campbellsville, KY 42718

Administration Office 8A

Phone: 270-789-5016

Email: twvanmeter@campbellsville.edu

Information regarding the reporting of sexual violence and the resources that are available to victims of sexual violence is set forth at: www.campbellsville.edu/titleIX.

TENTATIVE COURSE SCHEDULE		
Week	Topics	Assignments Due
Session 1	Introduction	PRE-Survey
Session 2	Nature of Science What is Research	Science or Pseudoscience Handout Scientific Literacy Test
Session 2	Finding a Research Mentor	Contact 5 potential mentors
Session 3	Finding your Research Topic	Research Experience Expectations
Session 4	Searching the Literature for Scientific Articles	Research Topic and Key Words
Session 5	Reading Scientific Articles and Mentoring Styles	Scientific Article Critique
Session 6	Documenting Your Research	Your Research Group's Focus
Session 7	Sticky Situations Sampling Techniques	Mentor Biography Mentor-Mentee Contract
Session 8	Research Design	Research Group Diagram
Session 9	Organizing Your Work	
Session 10	Designing Your Experiments	Background Information and Hypothesis or Research Question
Session 11	Surveys Ethics	Experimental Design & Potential Results with Timeline
Session 12	Poster Presentation The Research Proposal Abstract	
Session 13	The Research Proposal	
Session 14	Research Proposal Review Draft #1	Research Proposal Draft #1 Peer Reviews
Session 15	Research Proposal Review Draft #2	Research Proposal Draft #2 Peer Reviews
Session 16	Final Research Proposal Presentations	Final Research Proposal
Session 17	Career Choices	Research Experience Reflections POST-Survey

COURSE #: _____ **SEMESTER:** _____

COURSE TITLE: _____

Student's Acceptance of Course Policies

Please fill out and sign the following form and **return it no later than** _____ to the instructor. **Use a blue or black pen (no pencil).**

I, _____, have read the entire syllabus describing the course
(Print your name neatly)

policies for this course, taught by Ms. E. Kay Sutton. I fully understand these policies and I agree to comply with them during the entire _____ term.

Signature: _____ Date: _____