

NORTHWESTERN CONNECTICUT COMMUNITY COLLEGE

COURSE SYLLABUS

Course Title: FUNDAMENTAL CONCEPTS IN SCIENCE

Course #: SCI* 099

Course Description:

3 semester hours. An introduction to basic principles of chemistry and biology. Topics covered include scientific method, structure of matter, basic chemical reactions, cell structure and function and basic lab skills such as measurement with metric units and microscope use. This course is designed for students who wish to strengthen their basic science skills. Successful completion meets science prerequisite for BIO* 121 or BIO* 115

Pre-requisite/Co-requisite: ENG* 003 AND ENG* 013 or satisfactory score on placement test.

Goals:

To provide an introduction to and exploration of basic science concepts that are essential to success in a college level science course to students with little to no science background, to encourage students to develop study skills that will lead to success in college level science courses, and to provide an introduction to basic laboratory skills including measurement and microscope use.

Outcomes:

By the end of the course, students should be able to:

1. Explain the goal of science and describe the steps of the scientific method, including how a hypothesis is developed, and the importance of a variable and a control in a scientific experiment.
2. Explain what is meant by a scientific theory.
3. Explain the importance of a universal language of measurement
4. Identify and compare the metric units used to measure length, mass, volume, density, weight, and temperature.
5. Describe laboratory tools used to measure length, mass, volume, and temperature.
6. Use conversions (dimensional analysis) to convert one metric unit to another.
7. Describe the general and specific properties of matter.
8. Identify a physical change as an important physical property of matter.
9. Describe the four states of matter and their phase changes and discuss why a crystalline solid is different from a amorphous solid.
10. Explain how adding or taking away energy will produce a phase change and discuss the relationship between heat, energy, and phase change.
11. Distinguish between physical and chemical properties of matter and how these can be useful in identifying substances.
12. Distinguish between a chemical property and a chemical change.
13. Describe the three important properties of a mixture and compare a heterogeneous mixture and a homogeneous mixture.
14. Describe a pure substance and the relation between atoms and an element.
15. Identify the chemical symbols for some common elements.

16. Describe how a compound differs from an element.
17. Explain how a molecule is represented.
18. Describe how the atomic model has changed over time and explain the structure of the atom
19. including the properties of the three main subatomic particles.
20. Explain what is meant by isotopes of an element.
21. Describe chemical bonding in terms of an atom's electron arrangement.
22. Define energy level.
23. Describe the result of ionic bonding between elements as a regular pattern of ions.
24. When presented with a choice, predict which atoms are most likely to engage in covalent bonding.
25. Construct an electron-dot diagram for a covalently bonded molecule.
26. Describe the characteristics of chemical reactions.
27. Explain that a chemical reaction is accompanied by a change in properties and a change in energy of the substances involved in the reactions.
28. Explain how a substance's capacity to react is related to the arrangement of valence electrons.
29. Discuss how chemical equations are used to describe chemical reactions, explain how it illustrates the law of conservation of mass, and be able to balance that equation.
30. Describe and cite examples of synthesis, decomposition, single-replacement, and double-replacement reactions.
31. Define solution and name the two components of solutions.
32. State the properties of acids and bases, the use of indicators, and the nature of neutralization reactions.
33. Diagram the structural formulas of simple organic compounds and their isomers.
34. Define the term "organic" in terms of chemistry.
35. Discuss why carbon is such a versatile element.
36. Name the 4 classes of macromolecules found in living things. Give an example of each.
37. List the characteristics, organization, and needs of autotrophs and heterotrophs.
38. Describe the processes involved in metabolism.
39. State the three basic concepts included in the cell theory, what scientists were involved with its development, and the importance of the microscope.
40. Name the various organelles of both plant and animal cells and describe the function of each.
41. Discuss the processes of diffusion, osmosis, passive transport, and active transport.
42. Describe the phases of the cell cycle and the events that occur during mitosis and meiosis.
43. Name the reactants and products and describe the process and importance of photosynthesis and respiration.
44. Define genetics, heredity, and relate the work of Gregor Mendel to the development of the laws of genetics.
45. Define dominant, recessive, phenotypes, genotypes, hybrids, true-breeding, incomplete

dominance, co-dominance, selective breeding, hybridization, and inbreeding.

46. Explain the laws of segregation and independent assortment.

47. Explain how probability can be used to predict the results of genetic crosses and describe a Punnett square.

48. Explain the chromosome theory of heredity and name the primary components of a DNA molecule, its structure, how DNA is replicated, and the role of DNA in protein synthesis. [Soft Break]

49. **College Policies**

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51. **Plagiarism:** Plagiarism and Academic Dishonesty are not tolerated at Northwestern Connecticut Community College. Violators of this policy will be subject to sanctions ranging from failure of the assignment (receiving a zero), failing the course, being removed/expelled from the program and/or the College. Please refer to your "Student Handbook" under "Policy on Student Rights," the Section entitled "Student Discipline," or the College catalog for additional information.

52.

53. **Americans with Disabilities Act (ADA):** The College will make reasonable accommodations for persons with documented learning, physical, or psychiatric disabilities. Students should notify Dr. Christine Woodcock, the Counselor for Students with Disabilities. She is located at Green Woods Hall, in the Center for Student Development. Her phone number is 860-738-6318 and her email is cwoodcock@nwcc.edu.

54.

55. **School Cancellations:** If snowy or icy driving conditions cause the postponement or cancellation of classes, announcements will be made on local radio and television stations and posted on the College's website at www.nwcc.edu. Students may also call the College directly at **(860) 738-6464** to hear a recorded message concerning any inclement weather closings. Students are urged to exercise their own judgment if road conditions in their localities are hazardous.

56.

57. **Use of Electronic Devices:** Some course content as presented in Blackboard Learn is not fully supported on mobile devices at this time. While mobile devices provide convenient access to check in and read information about your courses, they should not be used to perform work such as taking tests, quizzes, completing assignments, or submitting substantive discussion posts.

58.

59. **Sexual Assault and Intimate Partner Violence Resource Team:** NCCC is committed to creating a community that is safe and supportive of people of all gender and sexual identities. This pertains to the entire campus community, whether on ground or virtual, students, faculty, or staff.

60. Sexual assault and intimate partner violence is an affront to our national conscience, and one we cannot ignore. It is our hope that no one within our campus community will become a victim of these crimes. However, if it occurs, NCCC has created the SART Team - Sexual Assault and Intimate Partner Violence Resource Team - to meet the victim's needs.

61. SART is a campus and community based team that is fully trained to provide trauma-informed compassionate service and referrals for comprehensive care. The team works in partnership with The Susan B. Anthony Project to extend services 24 hours a day, 7 days a week throughout the year.

62.

63. **The NCCC team members are:**

64. Ruth Gonzalez, Ph.D.	860-738-6315	Green Woods Hall Room 207
65. Susan Berg	860-738-6342	Green Woods Hall Room 223
66. Kathleen Chapman	860-738-6344	Green Woods Hall Room 110

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| 67. Michael Emanuel | 860-738-6389 | Founders Hall Annex Room 308 |
| 68. Seth Kershner | 860-738-6481 | Library |
| 69. Jane O'Grady | 860-738-6393 | Founders Hall Annex Room 212 |
| 70. Robin Orloski | 860-738-6416 | Business Office Room 201 |
| 71. Patricia Bouffard, Ex-Officio | 860-738-6319 | Founders Hall Room 103 |
| 72. Savannah Schmitt | | Student Representative |

73.

74. At NCCC we care about our students, staff and faculty and their well-being. It is our intention to facilitate the resources needed to help achieve both physical and emotional health.