

CHEMISTRY B.S. WITH INTEGRATED TEACHER EDUCATION PROGRAM (ITEP)

Program Learning Outcomes

1. Vanguard University Chemistry graduates should have demonstrated an understanding of the major concepts, theories, and experimental evidence of and the ability to solve problems in: Analytical Chemistry, Biological Chemistry, General Chemistry, Organic Chemistry, and Physical Chemistry;
2. Demonstrated competence in practical laboratory-based aspects of chemistry, including: basic laboratory skills, selection and use of modern instruments, proper standardization and calibration practices, and computer-based data acquisition;
3. Developed critical thinking skills and problem-solving approaches using scientific methods to: identify the relevant factors which define problems, develop and evaluate methods, employ appropriate statistical analysis and instrumentation, and draw reasonable conclusions;
4. Identified the principles in the American Chemical Society Ethics Code, recognized ethical components in complex situations, designed solutions appropriate to professional standards, and practiced science in a safe manner;
5. Demonstrated comprehension of chemical literature and the ability to communicate professionally about chemistry through writing in an accepted scientific format and orally in a public venue; and
6. Acquired familiarity with the process of chemical research through the formal participation in an undergraduate research project that involved: project management, methods development, data analysis, and written contribution to the discipline in the form of a presentation or publication.

Requirements

This program is associated with the Integrated Teacher Education Program (ITEP).

Code	Title	Units
	Core Curriculum Requirements (https://catalog.vanguard.edu/interdisciplinary-offerings/core-curriculum/) ¹	43
	Chemistry Major Requirements	52
	Integrated Teacher Education Program Requirements (p. 1)	36
Total Units		131

Chemistry Major Requirements

Code	Title	Units
Lower Division:		
CHEM-120 & 120L	General Chemistry I and General Chemistry I Lab ²	4
CHEM-121 & 121L	General Chemistry II and General Chemistry II Lab	4

CHEM-252 & 252L	Analytical Chemistry and Analytical Chem Techniques	4
MATH-180C	Calculus I	4
MATH-181C	Calculus II	4
PSCI-223C & 223CL	Mechanics of Solids and Fluids and Mechanics of Solids and Fluids Lab	4
PSCI-225 & 225L	Electricity and Magnetism and Electricity and Magnetism Lab	4
Upper Division:		
CHEM-304 & 304L	Organic Chemistry I and Organic Chemistry Techniques I	4
CHEM-305 & 305L	Organic Chemistry II and Organic Chemistry Technqs II	4
CHEM-430 & 430L	Biochemistry and Experimental Tech/Biochemistry	4
CHEM-456 & 456L	Physical Chemistry: Thermodynamics and Physical Chemistry Technique Lab	4
CHEM-485	Undergraduate Research	2
or CHEM-450	UG Research Or Internship Program	
or CHEM-488	Chemistry Senior Project	
CHEM-499C	Chemistry Capstone Seminar	2
Upper Division Chemistry Electives		
Select four (4) units from CHEM, ENVR, or ENGR		4
Total Units		52

1

Number of units required from the Core Curriculum not included in the major requirements below.

2

See CHEM-120 General Chemistry I course description for prerequisites.

Integrated Teacher Education Program Requirements

Code	Title	Units
Requirements:		
ANTH-453	Language,Culture/Linguistics	3
EDUC-315	Teaching in a Multicultural Setting	3
POLS-155C	American Democracy	3
Credentialing Coursework:		
EDUC-424	Foundations in Teaching for Single Subject	2
EDUC-426	Instructional Design and Subject Specific Pedagogy for Single Subject	4
EDUC-435	Supervised Fieldwork for Single Subject	4
EDUC-442	CalTPA Cycle 1	0.5
EDUC-444	Language Acquisition for Secondary Students	1
EDUC-447	Metacognition/Reading Strategies for Secondary Students	1
EDUC-452	Literacy in Content Areas for Secondary Students	1
EDUC-464	Use of Technology in the Classroom	1
EDUC-434	Curriculum Unit Planning for Single Subject	2
EDUC-443	CalTPA Cycle 2	0.5



EDUC-488	Clinical Practice Seminar for Single Subject	2
EDUC-489	Clinical Practice Fieldwork for Single Subject	8
Total Units		36

Four Year Plan

Disclaimer: This *sample* Four Year Plan is provided as a guide for the recommended sequencing of courses. Vanguard University requires that students complete a minimum of 120 units of required course work as outlined on the Requirements tab in order to receive a Bachelor of Arts, Bachelor of Music, Bachelor of Science, or Bachelor of Science in Nursing degree. It is the student's responsibility to confirm with the department the course rotation before enrolling in courses. If applicable, please note the footnotes at the bottom of the page for additional information related to courses listed in a particular year and term. Questions, contact the Department of Physical Science and Applied Mathematics.

Study Abroad Participation: Students interested in participating in the university's Study Abroad programs are encouraged to reach out to the Global Education and Outreach Office (studyabroad@vanguard.edu) for more information and collaboration in their academic course planning. Students using Education and Training Benefits through the U.S. Department of Veteran Affairs are encouraged to also reach out to the School Certifying Official (veteranscertifyingofficial@vanguard.edu) for more information regarding how benefits can be applied.

Course	Title	Units
Year 1 Term 1		
CORE-100C	Cornerstone	1
CHEM-120	General Chemistry I	3
CHEM-120L	General Chemistry I Lab	1
MATH-180C	Calculus 1	4
ENGL-120C	Persuasive Writing	3
NT-101C	New Testament Survey	3
KINE-148C	Lifetime Fitness and Wellness Lecture	3
Units		18
Year 1 Term 2		
CHEM-121	General Chemistry II	3
CHEM-121L	General Chemistry II Lab	1
FINA-PLCR	Fine Arts Core Curriculum Requirement	3
MATH-181C	Calculus II	4
HIST-PLCR1	History Core Req (US Hist Or Democracy)	3
Units		14
Year 2 Term 1		
EDUC-315	Teaching in a Multicultural Setting	3
CHEM-304	Organic Chemistry I	3
CHEM-304L	Organic Chemistry Techniques I	1
CHEM-252	Analytical Chemistry	3
CHEM-252L	Analytical Chem Techniques	1
THEO-101C	Foundations of Christian Life	3
Units		14

Year 2 Term 2		
CHEM-305	Organic Chemistry II	3
CHEM-305L	Organic Chemistry Technqs II	1
ENGL-220C	Researched Writing	3
OT-201C	Old Testament Survey	3
HIST-PLCR2	History Core Requirement (World Civ)	3
CHEM-PLUD4A	Upper Division STEM Elective (4 units)	4
Units		17

Year 3 Term 1		
COMM-201C	Speech Composition and Presentation	3
CHEM-450	UG Research Or Internship Program	1-4
CHEM-456	Physical Chemistry: Thermodynamics	2
PSCI-223C	Mechanics of Solids and Fluids	3
PSCI-223CL	Mechanics of Solids and Fluids Lab	1
Units		10-13

Year 3 Term 2		
ENGL-230C	Literature and the Human Experience	3
ANTH-453	Language,Culture/Linguistics	3
CHIS-400C	Christian Heritage	3
THEO-300C	Developing a Christian World View	3
PSCI-225	Electricity and Magnetism	3
PSCI-225L	Electricity and Magnetsm Lab	1
CHEM-456L	Physical Chemistry Technique Lab	1-2
Units		17-18

Year 4 Term 1		
EDUC-424	Foundations in Teaching for Single Subject	2
EDUC-426	Instructional Design and Subject Specific Pedagogy for Single Subject	4
EDUC-435	Supervised Fieldwork for Single Subject	4
EDUC-444	Language Acquisition for Secondary Students	1
EDUC-447	Metacognition/Reading Strategies for Secondary Students	1
EDUC-452	Literacy in Content Areas for Secondary Students	1
EDUC-464	Use of Technology in the Classroom	1
EDUC-442	CalTPA Cycle 1	0.5
Units		14.5

Year 4 Term 2		
CHEM-499C	Chemistry Capstone Seminar	2
EDUC-434	Curriculum Unit Planning for Single Subject	2
EDUC-488	Clinical Practice Seminar for Single Subject	2
EDUC-489	Clinical Practice Fieldwork for Single Subject	8
EDUC-443	CalTPA Cycle 2	0.5
Units		14.5

Total Units **119-123**

