

CHEMISTRY, BA

Banner Code: SC-BA-CHEM

Academic Advising

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This program, when coordinated with the necessary courses in education, meets requirements for teacher licensure. It also meets requirements for entrance to medical and other professional schools.

Teacher Licensure

Students who wish to become teachers and plan to seek teacher licensure should consider the following options:

- Secondary Education – Chemistry (6-12) Undergraduate Certificate
- Chemistry, BA or BS/Curriculum and Instruction, Accelerated MEd (Secondary Education Chemistry concentration)

Interested students should attend an information session early in their undergraduate career. For more information, visit the Graduate School of Education's website (<http://gse.gmu.edu>).

Admissions & Policies

Admissions

University-wide admissions policies can be found in the Undergraduate Admissions Policies section of this catalog.

To apply for this program, please complete the George Mason University Admissions Application (<https://www2.gmu.edu/admissions-aid/apply-now>).

Policies

Students must fulfill all Requirements for Bachelor's Degrees, including the Mason Core. As outlined in Requirements, students in this bachelor's program must also complete the additional College Requirements for the BA Degree.

CHEM 336 Physical Chemistry Lab I or CHEM 465 Biochemistry Lab will fulfill the writing intensive requirement.

For policies governing all undergraduate programs, see AP.5 Undergraduate Policies.

Requirements

Degree Requirements

Total credits: minimum 120

Students should refer to the Admissions & Policies tab for specific policies related to this program.

Students must complete the chemistry program requirements with a minimum GPA of 2.30 and present no more than two courses with a grade of 'D' (1.00) in CHEM coursework at graduation.

BA without Concentration

Students who do not select the optional concentration complete the curriculum requirements listed below.

Chemistry Courses

| | | |
|--|--|----|
| CHEM 211 | General Chemistry I (Mason Core) | 3 |
| CHEM 213 | General Chemistry Laboratory I (Mason Core) | 1 |
| CHEM 212 | General Chemistry II (Mason Core) | 3 |
| CHEM 214 | General Chemistry Laboratory II (Mason Core) | 1 |
| CHEM 313 | Organic Chemistry I | 3 |
| CHEM 314 | Organic Chemistry II | 3 |
| CHEM 315 | Organic Chemistry Lab I | 2 |
| CHEM 318 | Organic Chemistry Lab II | 2 |
| CHEM 321 | Quantitative Chemical Analysis | 4 |
| CHEM 331 | Physical Chemistry I | 3 |
| CHEM 332 | Physical Chemistry II | 3 |
| CHEM 336 | Physical Chemistry Lab I ¹ | 2 |
| CHEM 337 | Physical Chemistry Lab II | 2 |
| Select 5 credits of electives in chemistry | | 5 |
| Total Credits | | 37 |

¹ Fulfills the writing intensive requirement.

Mathematics Courses

| | | |
|---------------|---|----|
| MATH 113 | Analytic Geometry and Calculus I (Mason Core) | 4 |
| MATH 114 | Analytic Geometry and Calculus II | 4 |
| MATH 213 | Analytic Geometry and Calculus III | 3 |
| Total Credits | | 11 |

Physics Courses

| | | |
|---|---|---|
| Select one sequence of Mason Core: Natural Science courses: | | 8 |
| PHYS 243 & PHYS 244 & PHYS 245 & PHYS 246 | College Physics (Mason Core) and College Physics Lab (Mason Core) and College Physics (Mason Core) and College Physics Lab (Mason Core) | |
| PHYS 160 & PHYS 161 & PHYS 260 & PHYS 261 | University Physics I (Mason Core) and University Physics I Laboratory (Mason Core) and University Physics II (Mason Core) and University Physics II Laboratory (Mason Core) | |
| Total Credits | | 8 |

Concentration in Biochemistry (BC)

The concentration in biochemistry is designed for students interested in studying chemistry at its interface with the biological sciences. Those interested in health science careers can obtain an excellent science background through this concentration.

Students majoring in chemistry with a concentration in biochemistry will complete the alternative requirements for the major plus the concentration, both listed below.

Chemistry Courses

| | | |
|---------------|--|----|
| CHEM 211 | General Chemistry I (Mason Core) | 3 |
| CHEM 213 | General Chemistry Laboratory I (Mason Core) | 1 |
| CHEM 212 | General Chemistry II (Mason Core) | 3 |
| CHEM 214 | General Chemistry Laboratory II (Mason Core) | 1 |
| CHEM 313 | Organic Chemistry I | 3 |
| CHEM 314 | Organic Chemistry II | 3 |
| CHEM 315 | Organic Chemistry Lab I | 2 |
| CHEM 318 | Organic Chemistry Lab II | 2 |
| CHEM 321 | Quantitative Chemical Analysis | 4 |
| CHEM 331 | Physical Chemistry I | 3 |
| CHEM 336 | Physical Chemistry Lab I ¹ | 2 |
| CHEM 446 | Bioinorganic Chemistry | 3 |
| CHEM 463 | General Biochemistry I | 4 |
| CHEM 464 | General Biochemistry II | 3 |
| CHEM 465 | Biochemistry Lab ¹ | 2 |
| Total Credits | | 39 |

¹ Fulfills the writing intensive requirement.

Mathematics and Statistics Courses

| | | |
|---------------|---|----|
| MATH 113 | Analytic Geometry and Calculus I (Mason Core) | 4 |
| MATH 114 | Analytic Geometry and Calculus II | 4 |
| STAT 250 | Introductory Statistics I (Mason Core) | 3 |
| Total Credits | | 11 |

Physics Courses

Mason Core: Natural Science courses:

| | | |
|---------------|----------------------------------|---|
| PHYS 243 | College Physics (Mason Core) | 3 |
| PHYS 244 | College Physics Lab (Mason Core) | 1 |
| PHYS 245 | College Physics (Mason Core) | 3 |
| PHYS 246 | College Physics Lab (Mason Core) | 1 |
| Total Credits | | 8 |

Biology Courses

| | | |
|---------------|--|---|
| BIOL 213 | Cell Structure and Function (Mason Core) | 4 |
| Total Credits | | 4 |

Mason Core and Elective Credits

In order to meet a minimum of 120 credits, this degree requires additional credits (specific credit counts by concentration are shown below), which may be applied toward any remaining Mason Core requirements (outlined below), Requirements for Bachelor's Degrees, College Requirements for the BA Degree (outlined below), and elective courses. Students are strongly encouraged to consult with their advisors to ensure that they fulfill all requirements.

- Without concentration: 64 credits
- BC concentration: 58 credits

Mason Core

Note: Some Mason Core requirements may already be fulfilled by the major requirements listed above. Students are strongly encouraged to consult their advisors to ensure they fulfill all remaining Mason Core requirements.

| Code | Title | Credits |
|--|------------------------------------|---------|
| Foundation Requirements | | |
| | Written Communication | 6 |
| | Oral Communication | 3 |
| | Quantitative Reasoning | 3 |
| | Information Technology | 3-7 |
| Core Requirements | | |
| | Arts | 3 |
| | Global Understanding | 3 |
| | Literature | 3 |
| | Natural Science | 7 |
| | Social and Behavioral Sciences | 3 |
| | Western Civilization/World History | 3 |
| Synthesis/Capstone Requirement ¹ | | |
| | Synthesis/Capstone | 3 |
| Total Credits | | 40 |

¹ minimum 3 credits

College Requirements for the BA Degree

In addition to the program requirements and the Mason Core requirements, students pursuing a BA degree must complete the coursework below. Except where expressly prohibited, a course used to fulfill this college-level requirement may also be used simultaneously to satisfy other requirements such as Mason Core requirements, other college-level requirements, or requirements for the major. In some cases, the requirements listed below may be superseded by requirements of the degree program and the Mason Core.

Philosophy or Religious Studies

| Code | Title | Credits |
|--------------------------------------|-------------------|---------|
| Select 3 credits from the following: | | |
| | PHIL ¹ | 3 |
| | RELI | |

¹ PHIL 323 Classical Western Political Theory and PHIL 324 Modern Western Political Theory may not be used to fulfill this requirement.

Social and Behavioral Sciences

Choose one approved Mason Core: Social and Behavioral Sciences course in addition to the Mason Core-required course for a total of 6 credits. The two courses used to fulfill the combined college-level and university requirements must be from different disciplines.

This requirement may be fulfilled by completing any course in ANTH, CRIM, ECON, GOVT, HIST¹, LING, PSYC, or SOCI, and the following GGS courses:

| Code | Title | Credits |
|--|----------------------------------|---------|
| Select any course from the disciplines above or select from the following GGS courses: | | |
| GGS 101 | Major World Regions (Mason Core) | 3 |
| GGS 103 | Human Geography (Mason Core) | |

| | |
|---------------|---|
| GGG 110 | Introduction to Geoinformation Technologies |
| GGG 301 | Political Geography |
| GGG 303 | Geography of Resource Conservation (Mason Core) |
| GGG 304 | Population Geography (Mason Core) |
| GGG 305 | Economic Geography |
| GGG 306 | Urban Geography |
| GGG 315 | Geography of the United States |
| GGG 316 | Geography of Latin America |
| GGG 320 | Geography of Europe |
| GGG 325 | Geography of North Africa and the Middle East |
| GGG 330 | Geography of the Soviet Succession States |
| GGG 357 | Structures in Urban Governance and Planning |
| GGG 380 | Geography of Virginia |
| Total Credits | 3 |

¹ HIST 100 History of Western Civilization (Mason Core) and HIST 125 Introduction to World History (Mason Core) may not be used to fulfill this requirement.

Natural Science

Choose one credit in addition to the Mason Core: Natural Science requirement for a total of 8 credits. This combined college-level and university requirement must be fulfilled by completing two of any approved Mason Core: Natural Science courses that include a laboratory experience¹.

| Code | Title | Credits |
|--|-------|---------|
| Select an additional Mason Core Natural Science course | | 1 |

¹ BIOL 124 Human Anatomy and Physiology and BIOL 125 Human Anatomy and Physiology may not be used to fulfill this requirement.

Foreign Language

Intermediate-level proficiency in one foreign language is required¹. This requirement may be fulfilled by completing a course in a foreign language numbered 202, 209, or 210 (or higher-level courses taught in the language).

| Code | Title | Credits |
|---|-------|---------|
| Select a foreign language course numbered 202, 209, 210, or higher if a waiver isn't applicable | | 0-3 |

¹ Students may be eligible for a waiver of this requirement if they are already proficient in a second language or if they have received a satisfactory score on an approved proficiency test. Additional information on waivers can be found via the college's Office of Academic and Student Affairs (<https://cos.gmu.edu/uaa>).

Non-Western Culture

Choose one approved Non-Western Culture Requirement¹ course in addition to the course used to fulfill the Mason Core: Global Understanding requirement. A course used to fulfill the Mason Core: Global Understanding requirement may not be simultaneously used to satisfy this college-level requirement. However, a course used to fulfill this requirement may be used simultaneously to fulfill any *other*

requirements (Mason Core requirements, college-level requirements, or requirements for the major).

| Code | Title | Credits |
|--|---|---------|
| Select 3 credits from approved Non-Western Culture courses if a waiver isn't applicable: | | 0-3 |
| ANTH 114 | Introduction to Cultural Anthropology (Mason Core) | 3 |
| ANTH 300 | Civilizations | 3 |
| ANTH 301 | Native North Americans | 3 |
| ANTH 302 | Peoples and Cultures of Latin America (Mason Core) | 3 |
| ANTH 303 | Peoples and Cultures of the Andes | 3 |
| ANTH 306 | Peoples and Cultures of Island Asia (Mason Core) | 3 |
| ANTH 307 | Ancient Mesoamerica (Mason Core) | 3 |
| ANTH 308 | Peoples and Cultures of the Middle East (Mason Core) | 3 |
| ANTH 309 | Peoples and Cultures of India (Mason Core) | 3 |
| ANTH 313 | Myth, Magic, and Mind (Mason Core) | 3 |
| ANTH 314 | Zombies | 3 |
| ANTH 316 | Peoples and Cultures of the Caribbean (Mason Core) | 3 |
| ANTH 323 | Digging and Dealing in the Dead: Ethics in Archaeology | 3 |
| ANTH 330 | Peoples and Cultures of Selected Regions: Non-Western | 3 |
| ANTH 332 | Cross-Cultural Perspectives on Globalization (Mason Core) | 3 |
| ANTH 381 | Medical Anthropology | 3 |
| ANTH 383 | Cities of the Global South | 3 |
| ANTH 396 | Issues in Anthropology: Social Sciences (Mason Core) | 3 |
| ARAB 360 | Topics in Arabic Cultural Production | 3 |
| ARAB 420 | Survey of Arabic Literature | 3 |
| ARAB 440 | Topics in Arabic Religious Thought and Texts (Mason Core) | 3 |
| ARTH 203 | Survey of Asian Art (Mason Core) | 3 |
| ARTH 204 | Survey of Latin American Art (Mason Core) | 3 |
| ARTH 206 | Survey of African Art (Mason Core) | 3 |
| ARTH 318 | Art and Archaeology of Ancient Egypt | 3 |
| ARTH 319 | Art and Archaeology of the Ancient Near East (Mason Core) | 3 |
| ARTH 320 | Art of the Islamic World (Mason Core) | 3 |
| ARTH 382 | Arts of India (Mason Core) | 3 |
| ARTH 383 | Arts of Southeast Asia (Mason Core) | 3 |
| ARTH 384 | Arts of China (Mason Core) | 3 |
| ARTH 385 | Arts of Japan (Mason Core) | 3 |
| ARTH 386 | The Silk Road (Mason Core) | 3 |
| ARTH 482 | RS: Advanced Studies in Asian Art | 3 |
| CHIN 318 | Introduction to Classical Chinese (Mason Core) | 3 |
| CHIN 320 | Contemporary Chinese Film | 3 |

| | | | | | |
|----------|---|---|----------|---|-----|
| CHIN 325 | Major Chinese Writers (Mason Core) | 3 | HIST 365 | Conquest and Colonization in Latin America (Mason Core) | 3 |
| DANC 118 | World Dance (Mason Core) | 3 | HIST 366 | Comparative Slavery | 3 |
| ECON 361 | Economic Development of Latin America (Mason Core) | 3 | HIST 367 | History, Fiction, and Film in Latin America | 3 |
| ECON 362 | African Economic Development (Mason Core) | 3 | HIST 387 | Topics in Global History (Mason Core) | 3-6 |
| FREN 451 | Topics in Sub-Saharan Francophone Literature and Culture | 3 | HIST 426 | The Russian Revolution | 3 |
| FREN 454 | Topics in Caribbean Francophone Literature and Culture | 3 | HIST 460 | Modern Iran (Mason Core) | 3 |
| GGG 101 | Major World Regions (Mason Core) | 3 | HIST 461 | Arab-Israeli Conflict | 3 |
| GGG 316 | Geography of Latin America | 3 | HIST 462 | Women in Islamic Society (Mason Core) | 3 |
| GGG 325 | Geography of North Africa and the Middle East | 3 | HIST 465 | The Middle East in the 20th Century | 3 |
| GGG 330 | Geography of the Soviet Succession States | 3 | JAPA 310 | Japanese Culture in a Global World (Mason Core) | 3 |
| GGG 399 | Select Topics in GGS | 3 | JAPA 340 | Topics in Japanese Literature (Mason Core) | 3 |
| GOVT 328 | Non-Western Political Theory | 3 | KORE 320 | Korean Popular Culture in a Global World | 3 |
| GOVT 332 | Government and Politics of the Middle East and North Africa | 3 | MUSI 103 | Musics of the World (Mason Core) | 3 |
| GOVT 333 | Government and Politics of Asia | 3 | RELI 211 | Religions of the West (Mason Core) | 3 |
| GOVT 340 | Central Asian Politics | 3 | RELI 212 | Religions of Asia (Mason Core) | 3 |
| GOVT 341 | Chinese Foreign Policy | 3 | RELI 240 | Death and the Afterlife in World Religions | 3 |
| GOVT 345 | Islam and Politics | 3 | RELI 272 | Islam | 3 |
| GOVT 432 | Political Change and Social Development in Sub-Saharan Africa | 3 | RELI 313 | Hinduism (Mason Core) | 3 |
| GOVT 433 | Political Economy of East Asia | 3 | RELI 314 | Chinese Philosophies and Religious Traditions | 3 |
| HIST 251 | Survey of East Asian History (Mason Core) | 3 | RELI 315 | Buddhism (Mason Core) | 3 |
| HIST 252 | Survey of East Asian History (Mason Core) | 3 | RELI 337 | Mysticism: East and West | 3 |
| HIST 261 | Survey of African History (Mason Core) | 3 | RELI 365 | Muhammad: Life and Legacy | 3 |
| HIST 262 | Survey of African History (Mason Core) | 3 | RELI 374 | Islamic Thought (Mason Core) | 3 |
| HIST 271 | Survey of Latin American History (Mason Core) | 3 | RELI 375 | Qur'an and Hadith | 3 |
| HIST 272 | Survey of Latin American History (Mason Core) | 3 | RELI 379 | Islamic Law, Society, and Ethics | 3 |
| HIST 281 | Survey of Middle Eastern Civilization (Mason Core) | 3 | RELI 387 | Islam, Democracy, and Human Rights | 3 |
| HIST 282 | Survey of Middle Eastern Civilization (Mason Core) | 3 | RELI 490 | Comparative Study of Religions (Mason Core) | 3 |
| HIST 326 | Stalinism | 3 | RUSS 353 | Russian Civilization (Mason Core) | 3 |
| HIST 327 | The Soviet Union and Russia Since World War II | 3 | RUSS 354 | Contemporary Post-Soviet Life (Mason Core) | 3 |
| HIST 328 | Rise of Russia (Mason Core) | 3 | | | |
| HIST 329 | Modern Russia and the Soviet Union (Mason Core) | 3 | | | |
| HIST 353 | History of Traditional China | 3 | | | |
| HIST 354 | Modern China | 3 | | | |
| HIST 356 | Modern Japan (Mason Core) | 3 | | | |
| HIST 357 | Postwar Japan (Mason Core) | 3 | | | |
| HIST 358 | Post-1949 China (Mason Core) | 3 | | | |
| HIST 360 | History of South Africa (Mason Core) | 3 | | | |
| HIST 364 | Revolution and Radical Politics in Latin America (Mason Core) | 3 | | | |

¹ Students who can document attendance at a native school in a non-western country for at least four years may request a waiver from this requirement through the CHSS Undergraduate Academic Affairs Office (<http://chssundergrad.gmu.edu>).

Honors

Honors in the Major

Chemistry majors who have completed prerequisites for CHEM 455 Honors Research in Chemistry and CHEM 456 Honors Research in Chemistry and have maintained an overall GPA of at least 3.00 in mathematics and science courses are eligible to enter the departmental honors program. To graduate with honors in chemistry, a student is required to maintain a minimum GPA of 3.00 in mathematics and science courses and successfully complete the two semesters of CHEM 455 Honors Research in Chemistry and CHEM 456 Honors Research in Chemistry with a minimum GPA of 3.50.

In order to apply for Chemistry Honors, please complete the application (<https://cos.gmu.edu/chemistry/wp-content/uploads/sites/7/2015/08/form-honors-program-application-2016.pdf>) and submit it to the undergraduate coordinator.

Accelerated Master's

Chemistry, BA or BS/Curriculum and Instruction, Accelerated MEd (Secondary Education Chemistry concentration)

Overview

Highly-qualified undergraduates may be admitted to the bachelor's/accelerated master's option and obtain a BA or BS in Chemistry (degree without concentration) and an MEd in Curriculum and Instruction (concentration in secondary education chemistry) in an accelerated time frame after completion of 149 credits. See AP.6.7 Bachelor's/Accelerated Master's Degree for policies related to this program.

This accelerated option is offered jointly by the Department of Chemistry and Biochemistry and the Graduate School of Education.

Students in an accelerated degree program must fulfill all university requirements for the master's degree. For policies governing all graduate degrees, see AP.6 Graduate Policies.

Application Requirements

Applicants to all graduate programs at George Mason University must meet the admission standards and application requirements for graduate study as specified in Graduate Admissions Policies. For information specific to this accelerated master's program, see Application Requirements and Deadlines (<https://cehd.gmu.edu/bachelors-accelerated-masters-program>).

Accelerated Option Requirements

Students complete the following courses in their senior year:

| Senior | | | |
|---------------|---------|-----------------|---------|
| Fall Semester | Credits | Spring Semester | Credits |
| EDCI 573 | 3 | EDCI 673 | 3 |
| EDUC 672 | 3 | EDRD 619 | 3 |
| | 6 | | 6 |

Total Credits 12

While undergraduate students, accelerated master's students are able to apply two of the courses listed above to both the bachelor's and master's degrees. These courses are considered advanced standing for the MEd. A minimum grade of B must be earned to be eligible to count as advanced standing. The other two courses are taken as reserve graduate credit and do not apply to the undergraduate degree. Early in their final undergraduate semester, students must submit the Bachelor's/Accelerated Master's Transition Form to the CEHD Admissions Office and specify which of the four courses are to be designated as advanced standing and reserve graduate credit.