

College of Humanities and Sciences

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Interim Dean
B.A. 1972 Seton Hall University
Ph.D. 1978 University of North Carolina at Chapel Hill

Jon Steingass

Associate Dean of Undergraduate Affairs (2001)
B.S. 1984 University of Toledo
M.A. 1986 Bowling Green State University
Ph.D. 1997 University of Toledo

Laura J. Moriarty

Professor of Criminal Justice and Associate Dean of
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B.C.J. 1984 Louisiana State University
M.C.J. 1985 Louisiana State University
Ph.D. 1988 Sam Houston State University

Mission of the college

The faculty and staff of the College of Humanities and Sciences are dedicated to excellence in teaching, research and public service. The mission of Virginia Commonwealth University provides the framework for this pursuit of excellence.

Teaching and learning are central to the college, and the college is central to the educational and intellectual life at VCU. The college meets the educational needs of a diverse student body, provides general education for all undergraduate students of the university, preparatory programs for the health sciences, engineering and law, and educates future teachers in the liberal arts and sciences. The college offers comprehensive undergraduate, graduate and professional programs of study that link a foundation of understanding and knowledge with skills on which students can build careers, become responsible citizens and continue lifelong learning.

Scholarship, creative work and professional accomplishment are essential to teaching and learning. The college is responsible for advancing understanding and increasing

knowledge for its own sake, for the educational benefit of its students, and for the good of the larger community.

In both teaching and research, the College of Humanities and Sciences seriously upholds the responsibilities of being part of a public, metropolitan university. Through service and public teaching, the college meets the challenges and opportunities afforded by VCU's urban environment and by its location in the capital of the commonwealth.

The college achieves national and international recognition through the success of its students, the advancement of the disciplines and professions represented by its programs, and through the individual and collaborative research of its faculty.

Undergraduate degree programs

The College of Humanities and Sciences offers baccalaureate degrees in 23 areas:

African American Studies – B.A.
Anthropology – B.S.
Biology – B.S.
Chemistry – B.S.
Criminal Justice – B.S.
 forensic crime scene investigation
 justice
Economics – B.S.
English – B.A.
Foreign Languages – B.A.
 French
 German
 Spanish
Forensic Science – B.S.
History – B.A.
Homeland Security and Emergency Preparedness – B.A.
Interdisciplinary Studies – B.I.S.
 individualized
 liberal studies
 women's studies
International Studies – B.A.
 area studies
 global studies
Mass Communications – B.S.
 advertising
 journalism
 broadcast
 print
 public relations

Mathematical Sciences – B.S.
 applied mathematics
 mathematics
 operations research
 secondary mathematics teacher preparation
 statistics
Philosophy – B.A.
 ethics and public policy
Physics – B.S.
Political Science – B.A.
Psychology – B.S.
Religious Studies – B.A.
Science – B.S.
 biology
 chemistry
 general science
 mathematical sciences
 physics
Sociology – B.S.
Urban Studies and Geography – B.S.
 generalized
 geography
 urban studies

Information concerning curricula is given in the respective departmental and school sections.

Minors

In addition to a major, a student may elect a minor area of study in any program or department offering such a program. The minor can be used to fulfill career needs or serve as a means for the student to study a discipline of secondary interest.

Students interested in pursuing a minor should discuss their intentions with their advisers or the chair of the major department. When the student decides on a minor, a Change of Major/Minor form must be completed in the Office of Records and Registration. When the student files for graduation, the student must complete the Minor Application along with the Graduation Application.

Courses for the minor should be chosen from courses approved by departments offering minors in their areas. Generally, students can not minor in the same area as their major.

A minor designation on the transcript requires a minimum of 18 credit hours and a minimum 2.0 GPA must be achieved in the minor. Prerequisites for courses are stated under course descriptions in this bulletin.

Detailed descriptions of each minor appear under the various departmental headings in this section of the bulletin.

Areas in which certificates are awarded are designated with an asterisk.

Minors are offered in the following areas:

African American studies
American studies
anthropology
area studies
 African
 Asian
 Latin American
 Middle Eastern
 Russian and Eastern European
 Western European
biology
Catholic studies
chemistry
criminal justice
economics
English
French
geography
German
global studies
 the arts in global perspective
 health in global perspective
 international institutions and globalization
 international relations
 international social justice studies
 social relations in international perspective
history
homeland security and emergency preparedness
international management studies
Islamic studies
Italian
Judaic studies
Latin and Roman studies
mathematical sciences
media studies
Native American studies
philosophy
philosophy of law
physics
political science
psychology
public management
religious studies
sociology
Spanish
statistics
urban studies
women's studies
writing (see English)

Preparation for professional studies

In addition to providing studies in liberal arts at the undergraduate and graduate levels, the college offers undergraduate preparatory programs and advising for the following areas:

pre-clinical laboratory sciences
pre-dental hygiene
pre-dentistry
pre-law
pre-medicine
pre-nursing
pre-occupational therapy
pre-optometry
pre-pharmacy
pre-physical therapy
pre-radiation sciences
pre-veterinary medicine

Specific curricular descriptions are listed elsewhere in this section.

Teacher preparation

Students in the college can apply to the Extended Teacher Preparation Program sponsored jointly with the School of Education. This program awards both a bachelor's degree from the College of Humanities and Sciences and a master's degree from the School of Education. Students who successfully complete this program will be certified to teach in early childhood, middle or secondary education.

Additional information on this five-year program is available at the School of Education's Office of Student Services in Room 3106, Oliver Hall, or by calling (804) 827-2670. A more thorough description of this program is found under the "School of Education" chapter of this bulletin and in the Extended Teacher Preparation Handbook available from the School of Education's Department of Teaching and Learning or the College of Humanities and Sciences Dean's Office.

Information about VCU students' performances on the state-mandated licensure tests (Praxis I: Reading, Writing and Mathematics and Praxis II: Specialty Area Tests) is available on the School of Education Web site: <http://www.soe.vcu.edu>.

Graduate studies

Master's degree programs are offered in biology, chemistry, creative writing, criminal justice, forensic science, English, history, mass communications, mathematical sciences, physics and applied physics, psychology, public administration, sociology, and urban and regional planning.

Doctoral programs are available in chemistry (including chemical physics), medical physics and psychology. Doctoral programs also are available in urban services through the School of Education, in public administration through the Center for Public Policy, and Integrative Life Sciences through VCU Life Sciences. The Graduate and Professional Programs bulletins describes these graduate programs in detail, and is available online at <http://www.vcu.edu/bulletins>.

Student advising

Seth Sykes

Director of Academic Advising (2000)
B.D. 1988 University of St. Andrews, Scotland
Th.M. 1989 Princeton Theological Seminary
Ph.D. 1997 Union Theological Seminary

Academic advising is integral to each program of study in the college, and is an ongoing process that helps students to develop, pursue and achieve their educational and personal goals. The adviser assists students to understand university procedures, interpret general education and major requirements, address academic difficulties, explore majors and connect majors to careers. Student are assigned an academic adviser within their first semester.

Undeclared majors and freshmen receive advising through the Office of Academic Advising. After the freshman year or when the undeclared student declares a major, the department in which the student intends to major assigns a faculty adviser to each student.

Students are responsible for making sure course selections satisfy graduation requirements of the departmental major programs, general requirements of the College of Humanities and Sciences and general degree requirements of the Monroe Park Campus. Consultation with the adviser, and/or dean, along with frequent reference to this bulletin and college graduation worksheets ensure that students meet these responsibilities.

Students also are responsible for familiarizing themselves with academic regulations of the Monroe Park Campus concerning change of major, continuance, etc., as explained in the “Academic Regulations and General Degree Requirements” chapter of this bulletin.

College Success Program

Xochela V. James

Director (1979)
B.S. 1968 Virginia State University
M.S. 1975 Virginia Commonwealth University
Ph.D. 1990 Virginia Commonwealth University

The mission of the College Success Program is to provide assistance to students that will help them to attain their academic potential and make a successful transition to college. The CSP will focus on the development of student success tools including both retention strategies and incorporation of instructional technology and other intervention methods. The CSP seeks to enhance the success and promote the retention of all students.

The CSP provides services as well as referrals to other support programs. The program provides advising, personal counseling, tutoring, career exploration and a variety of workshops and seminars designed to meet specific student needs. Students may be referred to the program as a condition of their admission to the university. These students will participate in a developmental program during their freshman year. This yearlong experience allows students to ease into the rigorous demand of university life by improving basic academic skills and personal confidence.

The CSP is comprised of components designed to improve academic performance and enhance persistence. These components include: learning communities, intrusive academic advising, orientation courses, peer mentoring, tutoring, and special assistance in selected academic courses. Students are invited to visit the CSP at 109 N. Harrison St., telephone (804) 828-1650 or e-mail success@vcu.edu.

Campus Learning Center

Michal Z. Coffey

Director (2003)
A.A. 1997 Simon's Rock College of Bard
B.A. 1999 Mary Baldwin College
M.A. 2001 Texas Tech University

The university offers an extensive range of learning support services that assists students in most general education and introductory courses offered on the Monroe Park Campus. Individual and group tutoring are provided by a cadre of trained and certified undergraduate tutors. In addition, the Supplemental Instruction program offers peer-facilitated group study sessions to assist students in learning how to integrate study skills with course material in their larger introductory classes.

The Campus Learning Center is located at 109 N. Harrison St.; telephone (804) 828-1650. Students may complete a tutor request form to receive these services, all of which are free of charge.

Educational goals

The ultimate goal of a liberal arts education is to help students develop the abilities to think and continue their learning. These skills will aid students as they take their places in a world dominated by change. These abilities also will aid students in their future endeavors as they encounter problems, whether in their personal or professional lives, or in their communities. Graduates of the College of Humanities and Sciences are broadly educated, not simply trained, allowing them to function as understanding participants in events rather than as spectators or even victims of those events.

To achieve this goal, the faculty of the College of Humanities and Sciences has identified the following specific requirements.

- Students should write well, organize their ideas, support them and communicate them clearly and effectively.
- Students should reason logically and be able to quantify experiences.
- Students should have knowledge of the fundamental ideas and methods of the natural sciences.
- Students should be able to analyze ethical conflicts.
- Students should have an understanding of literature and the other arts.
- Students should have a knowledge of American heritage and those of other cultures, along with an introduction to a foreign language.

- Students should have a basic knowledge of human behavior and social, political and cultural institutions.

Graduation requirements

For students majoring in a four-year Bachelor of Arts or Bachelor of Science degree program (including students in the pre-dental, pre-medical, pre-optometry, pre-veterinary and extended teacher preparation program classifications), there are four areas of requirements that the student must complete for graduation:

1. Undergraduate General Education Program requirements (see the “Virginia Commonwealth University” chapter of this bulletin),
2. general education requirements of the College of Humanities and Sciences (see departmental major sections for collateral requirements),
3. departmental major requirements and
4. electives to complete the total of a minimum of 120 credits.

General education requirements

In the following section, specific courses that fulfill general education requirements are described. Approved lists from which students must choose courses to complete particular requirements also are listed in this section.

Specific courses recommended by a department to fulfill one or more of the College of Humanities and Sciences' general education requirements are listed under the degree requirement heading in each departmental section. Students should check these listings.

Major or minor courses may fulfill general education requirements when those courses appear among the following general education requirements or on the approved lists of courses. However, no one course can be used to fulfill two general education requirements, with the exception of courses used to meet the “writing intensive” or “urban environment” requirements.

All Bachelor of Arts and Bachelor of Science degree programs require students to complete a minimum of 120 credits. No more than four of those credits can be physical education/activity courses.

General education requirements for Bachelor of Arts and Bachelor of Science degrees

The purpose of general education courses in the College of Humanities and Sciences is to provide a foundation for lifelong learning among its students. This foundation includes the acquisition of information, the capacity and the propensity to engage in inquiry and critical thinking, the use of various forms of communication, an awareness of the diversity of human experience, an understanding of the natural world, and an appreciation of the responsibilities of people to themselves, to others and to the community.

1. Communicating credits
8 to 12*

A. Composition and rhetoric. ENGL 101-200 or equivalent, with minimum of "C" grade in each course. All students who have not received credit for first-semester freshman composition and rhetoric through AP, IB, dual enrollment or a college course must enroll in ENGL 101. ENGL 200 is taken in the second semester of sophomore year.

B. Writing intensive requirement. Two writing intensive (WI) courses. Students must fulfill both of the following:

- i) One writing intensive course within the student's major. See "Approved list A" in the Schedule of Classes each semester. and
- ii) One writing intensive course from several alternatives or from the major. See "Approved list A" in the Schedule of Classes each semester.

The process of writing takes place in all disciplines. Specific sections of courses will be designated in a variety of disciplines that will provide students with opportunities for substantial writing while at the same time completing a major course or elective.

* This figure assumes six credits in ENGL 101-200 and two to six credits in writing intensive courses.

2. Ethics 3

One course in ethics either within the major or from another department (see "Approved list C").

3. Quantity and form 3 to 6

Proficiency in mathematics through the level of algebra and one course in statistics as specified by the major department. (Check major departmental section of this bulletin.)

A. Mathematics. Proficiency may be demonstrated through the Mathematics Placement Test or acquired through completion of MATH 131

Introduction to Contemporary Mathematics or MATH 151 Precalculus Mathematics.

B. Statistics. One three-credit course chosen from STAT 208 Statistical Thinking or STAT 210 Basic Practice of Statistics. Check departmental major section for required statistics course. Mathematical sciences and computer science majors must take STAT 212 Concepts of Statistics.

Students majoring in physics or the professional sequence in the chemistry major will have the statistics requirement fulfilled through required 300-level mathematics courses as specified by the major.

C. Critical thinking. Critical thinking activities are incorporated in general education courses. In addition, critical thinking activities will be embedded in specific parts of major curricula and courses.

4. Science and technology 7 to 9

A. Two natural science courses, one from the physical sciences and one from the biological sciences. One of the two courses must include a laboratory (see "Approved list D"). Check departmental major section of this bulletin for required courses to fulfill this requirement.

B. Computer literacy and information retrieval. Students should be able to understand basic computer concepts in order to accomplish a wide variety of tasks, including gathering information, organizing and analyzing data, synthesizing information, and communicating ideas.

All students must either:

- i. pass the Computer Proficiency Assessment prior to graduation; or
- ii. successfully complete computer literacy courses, including INFO 160, 161 and 162 or equivalent.

5. Civilization 8 to 9

Courses dealing with the origin of the modern world, the 20th-century United States and the contemporary interdependent world.

Students must take one course (three credits) from each of the following areas (nine credits total) but no more than six credits in any one discipline; or take two four-credit interdisciplinary courses (eight credits total) that combine elements of A, B and C below.

- A. Historical and cultural origins (see "Approved list G")
- B. American (U.S.) studies (see "Approved list H")
- C. Global studies (see "Approved list I")

6. Foreign language 0 to 8

Completion of a foreign language through the 102 level or equivalent course or by placement.

English, history and political science majors require competency through the intermediate level (202 or 205) or 0-14 credits. (Check with the Department of Foreign Languages for availability of the intermediate level of the language.)

Students may present American Sign Language courses in fulfillment of the foreign language requirement.

A. Freshmen who wish to continue in their high school language will be given a placement test to determine the level at which they will begin language study for credit.

Students who want to begin study of a language different than the high school language need not take the placement test and may begin with the elementary (101) course for credit.

B. Students transferring from other colleges and universities with advanced placement (credit) or advanced standing through placement will receive credits as granted by the other institutions and should register for the next course in the sequence. Transfer students who have not begun foreign language study at the collegiate level and who wish to continue study with their high school language are subject to the provisions of the previous paragraph.

C. New freshmen and transfer students who qualify through the elementary level (102) of a foreign language on the placement test (or the 202 level for English, history or political science majors) receive no semester credit but have satisfied the language requirement.

7. Visual and performing arts 2 to 4

One course in the visual or performing arts (see "Approved list E").

8. Literature and social sciences 9 to 10

A. Literature 3
One literature course (see "Approved list F")

B. Human behavior 6 to 7
Two courses in different disciplines focusing on human behavior (see "Approved list J")

9. Urban environment 3

Students attending a public, urban university should have some understanding and appreciation of the urban environment, the challenges and opportunities that face cities today, and the influences of cities on human activities. The three-credit requirement dealing with aspects of modern urban life may be completed within the major, through general education courses or as an elective. With a few exceptions, the course will be taken at VCU during the last 60 credits (see "Approved list K").

Major requirements

See departmental curriculum for exact number of credits (30 credit minimum).

Elective requirements

Elective courses to complete the total required 120 credits.

Approved lists for students entering fall 1997 and thereafter

Approved list A – Written communications

(See course descriptions in the bulletin for any prerequisites.)

Freshman English

ENGL 101 Writing and Rhetoric Workshop I
ENGL 200 Writing and Rhetoric Workshop II
(Taken in second semester of sophomore year.)

Writing intensive courses

African American studies

AFAM 408 Seminar in African American Studies

Anthropology

ANTH 301/BIOL 341 Human Evolution
ANTH/GEOG 302 Archeological Theory
ANTH 303 Archeological Methods and Research Design
ANTH/INTL 348 South American Ethnography
ANTH/INTL 349 Rethinking a Continent: Latin America
ANTH/INTL 350 Rethinking a Continent: Europe
ANTH/RELS/INTL 425 Religion, Magic and Witchcraft

Biology

BIOL 300 Biotechniques Laboratory (.5 WI credit)
BIOL 309 Entomology (.5 WI credit)
BIOZ 310L Laboratory in Genetics (.5 WI credit)
BIOZ 311L Animal Physiology Laboratory (.5 WI credit)
BIOZ 312L Invertebrate Zoology Laboratory (.5 WI credit)
BIOZ 317L Ecology Laboratory
BIOL 320 Biology of the Seed Plant (.5 WI credit)
BIOZ 321L Plant Development Laboratory
BIOL 341/ANTH 301 Human Evolution
BIOL 392 Introduction to Research
BIOL 401 Applied and Environmental Microbiology
BIOL 445 Neurobiology and Behavior (.5 WI credit)
BIOL 518 Plant Ecology (.5 WI credit)
BIOL 522 Evolution and Speciation
BIOL 541 Laboratory in Molecular Genetics (.5 WI credit)

Chemistry

CHEZ 303L Physical Chemistry Laboratory I
CHEZ 409L Instrumental Analysis Laboratory

Criminal justice

CRJS/ENGL 302 Legal Writing
CRJC 358 Lawyer's Role in the Justice System
CRJS 480 Senior Seminar

Economics

ECON 302 Macroeconomic Theory

English

ENGL 301 English Studies: Reading Literature
ENGL/CRJS 302 Legal Writing
ENGL 303 Writing in the Workplace
ENGL 304 Advanced Writing
ENGL/MGMT 327 Business and Technical Report Writing
ENGL/RELS 361 The Bible as Literature
ENGL 385 Nature Writing
ENGL 490 Senior Seminar in English (any topic)

Environmental studies

ENVS 490 Research Seminar in Environmental Studies

French

FREN 300, 301 Advanced Grammar and Writing

Forensic science

FRSC 365 Forensic Microscopy
FRSC 375 Forensic Evidence, Law and Criminal Procedures

German

GRMN 301 Advanced Grammar and Writing

Geography

GEOG/URSP 306 Urban Economic Geography
GEOG /INTL 303, 304 World Regions

History

HIST 300 Introduction to Historical Study
HIST 369 American Constitutional and Legal Development
HIST 490 Seminar in History (any topic)

Homeland security and emergency preparedness

HSEP 330 Legal and Constitutional Issues in Homeland Security and Emergency Preparedness
HSEP 490 Senior Seminar

Humanities and sciences

HUMS 591 Arts in Contemporary Britain (summer course only)

Interdisciplinary science

INSC 301 Investigatory Mathematics and Science

International studies

GEOG /INTL 303, 304 World Regions
INTL/ANTH 348 South American Ethnography
INTL/ANTH 349 Rethinking a Continent: Latin America
INTL/ANTH 350 Rethinking the Continent: Europe
INTL/POLI 365 International Political Economy
INTL/RELS/WMNS 372 Global Women's Spirituality
INTL/RELS 409 Modern Islamic Thought and Global Trends
INTL/RELS/PHIL 412 Zen Buddhism

INTL/ANTH/RELS 425 Religion, Magic and Witchcraft

INTL/RELS 441 Islamic Mysticism: the Sufis
INTL/POLI 468 Seminar in Comparative Foreign Policy

INTL 490 Seminar in International Issues

Mass communications

MASC 203 Writing for Mass Media
MASC 333 Public Relations Writing
MASC 363 Electronic Media Writing I
MASC 403 Advanced Reporting
MASC 404 Specialized Project Reporting

Mathematics

MATH 490 Mathematical Expositions
MATH 530 The History of Mathematics
MATH 531 Expositions in Modern Mathematics

Management/business

MGMT/ENGL 327 Business and Technical Report Writing

Philosophy

PHIL 301 Mind and Reality
PHIL 302 Reason and Knowledge
PHIL 303 Philosophy of Language
PHIL 320 Philosophy of Law
PHIL 335 Social and Political Philosophy
PHIL/INTL/RELS 412 Zen Buddhism
PHIL 490 Seminar in Philosophy

Physics

PHYS 450 Senior Physics Laboratory

Political science

POLI/WMNS 316 Women and the Law
POLI 341, 342 History of Political Thought
POLI/INTL 365 International Political Economy
POLI/INTL 468 Seminar in Comparative Foreign Policy
POLI 490 Senior Seminar: Political Science Capstone Course

Psychology

PSYC 317 Experimental Methods

Religious studies

RELS/ENGL 361 The Bible as Literature
RELS/WMNS 371 Islam and Women
RELS/WMNS/INTL 372 Global Women's Spirituality
RELS/INTL 409 Modern Islamic Thought and Global Trends
RELS/PHIL/INTL 412 Zen Buddhism
RELS/INTL/ANTH 425 Religion, Magic and Witchcraft
RELS/INTL 441 Islamic Mysticism: the Sufis
RELS 490 Seminar in Religious Studies

Sociology

SOCY 402 Sociological Theory
SOCY 436 Work and Management in Modern Society

Spanish

SPAN 300, 301 Advanced Grammar and Writing

Statistics and operations research

STAT/OPER 490 Communications in Statistics and Operations Research

Urban studies

URSP/GEOG 306 Urban Economic Geography

Women's studies

WMNS/POLI 316 Women and the Law

WMNS/RELS 371 Islam and Women

WMNS/INTL/RELS 372 Global Women's Spirituality

WMNS 401 Topical Senior Seminar

Approved list B – Mathematics and statistics

(See course descriptions in the bulletin for any prerequisites.)

MATH 131 Introduction to Contemporary Mathematics

MATH 151 Precalculus Mathematics

MATH 200 Calculus with Analytic Geometry

STAT 208 Statistical Thinking

STAT 210 Basic Practice of Statistics

STAT 212 Concepts of Statistics (for science majors only)

Approved list C – Ethical principles

(See course descriptions in the bulletin for any prerequisites.)

International studies

INTL 341/RELS 340 Global Ethics and the World's Religions

Mass communication

MASC 290 Ethical Problems in Mass Media

Philosophy

PHIL 211 History of Ethics

PHIL 212 Ethics and Applications

PHIL 213 Ethics and Health Care

PHIL 214 Ethics and Business

Political science

POLI 107 Political Theory

Religious studies

RELS 340/INTL 341 Global Ethics and the World's Religions

Sociology

SOCY 445 Medical Sociology

Approved list D – Natural sciences

(See course descriptions in the bulletin for any prerequisites.)

Biological sciences

BIOL 101 Biological Concepts

BIOZ 101L Biological Concepts Laboratory

BIOL/ENVS 103 Environmental Science

BIOZ/ENVZ 103L Environmental Science Laboratory

BIOL 151 Introduction to Biological Science I (for biology and other majors)

BIOZ 151L Introduction to Biological Science Laboratory I (for biology and other science majors)

BIOL 152 Introduction to Biological Science II (for biology and other science majors)

BIOZ 152L Introduction to Biological Science Laboratory II (for biology and other science majors)

Physical sciences

Chemistry

CHEM 101 General Chemistry (for science majors)

CHEZ/FRSZ 101L General Chemistry Laboratory (for science majors)

CHEM 110 Chemistry and Society

CHEZ 110L Chemistry and Society Laboratory

CHEM 112 Chemistry in the News

Forensic Science

FRSZ/CHEZ 101L General Chemistry Laboratory (for science majors)

Physics

PHYS 101 Foundations of Physics

PHYZ 101L Foundations of Physics Laboratory

PHYS 103 Elementary Astronomy

PHYZ 103L Elementary Astronomy Laboratory

PHYS 107 Wonders of Technology

PHYS 202 General Physics (for science majors)

PHYS 208 University Physics II (for science majors)

Approved list E – Visual and performing arts

A. Basic-level courses designed specifically for non-arts majors.

Art education

ARTE 121-122 The Individual in the Creative Process

ARTE 301-302 Art for Elementary Teachers

ARTE 408 Two-dimensional Art Experiences

ARTE 409 Three-dimensional Art Experiences

Art foundation

ARTF 121-122 Introduction to Drawing

Dance and choreography

DANC 171, 172 T'ai Chi

DANC 183, 184 Introduction to Modern Dance Technique

DANC 313 Dance in World Cultures

Interior design

IDES 103-104 Introductory Studio Course

Music

MHIS 105 Introduction to Writing Music

MHIS 243 Music Appreciation

Sculpture

SCPT 209 Introduction to Sculpture

Theatre

THEA 107, 108 Introduction to Stage Performance

B. Basic-level courses open to both art and non-art majors.

African American studies

AFAM/DANC 121, 122 Tap Technique I

AFAM/DANC 126, 127 African-Caribbean Dance

AFAM/IMHIS 250 Introduction to African-American Music

AFAM/THEA 303 Black Theatre

AFAM 350/MHIS 350/INTL 370 Studies in the Music of the African Continent and Diaspora

Art history

ARTH 103, 104 Survey of Western Art

ARTH 145, 146 Survey of Asian Art

ARTH 207 Introduction to Non-Western Art

ARTH 270, 271 History of the Motion Picture

Crafts

CRAF 201-202 Metalsmithing

CRAF 211-212 Jewelry

CRAF 221 Woodworking Techniques

CRAF 241 Ceramics: Handbuilding

CRAF 242 Ceramics: Wheelthrowing

CRAF 251, 252 Introduction to Glassworking

CRAF 261, 262 Beginning Textiles

Dance and choreography

DANC 103-104 Survey of Dance History

DANC 105-106 Improvisation

DANC 111-112 Ballet Technique I

DANC 114, 214, 314, 414 Summer Dance Workshop

DANC/AFAM 121, 122 Tap Technique I

DANC/AFAM 126, 127 African-Caribbean Dance I

DANC 141, 142 Ballroom Dancing

DANC 243 Dynamic Alignment

DANC 291 Topics in Dance

DANC 313 Dance in World Cultures

Fashion design and merchandising

FASH 240 Survey of the Fashion Industry I

Interior design

IDES 103-104 Introductory Studio Course

International studies

INTL 370/AFAM 350/MHIS 350 Studies in the Music of the African Continent and Diaspora

Music

APPM 300-level Private Instruction: Principal and Secondary Performing Mediums

APPM 370 Large Ensembles (auditions required for all sections)

APPM 390 Small Ensembles (auditions required for all sections)

MHIS 120 Introduction to Musical Styles

MHIS/AFAM 250 Introduction to African-American Music

MHIS 350/INTL 370/AFAM 350 Studies in the Music of the African Continent and Diaspora

Theatre

THEA 103 Stagecraft

THEA 211-212 Introduction to Drama

THEA 229 Introduction to Lighting Design

THEA/AFAM 303 Black Theatre

C. Advanced-level courses open to both arts and non-arts majors.

Some require special permission/audition.

Dance and choreography

DANC 221, 222 Tap Technique II

DANC 319, 320 Video/Choreography Workshop

Approved list F – Literature

English

ENGL 201 Western World Literature I

ENGL 202 Western World Literature II

ENGL 203 British Literature I

ENGL 204 British Literature II

ENGL 205 American Literature I

ENGL 206 American Literature II

ENGL 211 Contemporary World Literature

ENGL 215 Readings in Literature

ENGL 216 Readings in Narrative

ENGL/WMNS 236 Women in Literature

ENGL 241 Shakespeare's Plays

ENGL 291 Topics in Literature

Women's studies

WMNS/ENGL 236 Women in Literature

Approved list G – Historical and cultural origins

African American studies

AFAM/HIST 105 Survey of African History I

AFAM/HIST 106 Survey of African History II

Anthropology

ANTH 105/INTL 104 Introduction to Archaeology

ANTH/GEOG 312 History of Human Settlement

Foreign language

FRLG/INTL 203 Language and Identity

Geography

GEOG/ANTH 312 History of Human Settlement

History

HIST 101 Survey of European History I

HIST 102 Survey of European History II

HIST/AFAM 105 Survey of African History I

HIST/AFAM 106 Survey of African History II

HIST 107 Survey of East Asian Civilizations I

HIST 108 Survey of East Asian Civilizations II

HIST 109 Survey of Latin American History I

HIST 110 Survey of Latin American History II

International studies

INTL 104/ANTH 105 Introduction to Archaeology

INTL/FRLG 203 Language and Identity

INTL/RELS 311 Religions of the World I

INTL/RELS 312 Religions of the World II

Italian

ITAL 391/HUMS 491 Perugia Study Abroad

Philosophy

PHIL 103 Ancient Greek and Medieval Western

Philosophy

PHIL 104 Modern Western Philosophy

Religious studies

RELS/INTL 311 Religions of the World I

RELS/INTL 312 Religions of the World II

Approved list H – American studies (United States)

American studies

AMST 394 Perspectives in American Studies

Foreign language

FRLG/INTL 204 Language and Groups in the United States

History

HIST 103 Survey of American History I

HIST 104 Survey of American History II

International studies

FRLG/INTL 204 Language and Groups in the United States

Political science

POLI 103 U.S. Government

Religious studies

RELS 334 Religion in Contemporary America

Approved list I – Global studies

Anthropology

ANTH/INTL 455 Anthropology of Development and Globalization (INTL 101 prerequisite)

Geography

GEOG/INTL 303, 304 World Regions

International studies

INTL 101 Human Societies and Globalization

INTL/POLI 105 International Relations

INTL/MASC 151 Communications Technology and Global Society

INTL/ GEOG 303, 304 World Regions

INTL/SOCY 330 Global Societies: Trends and Issues

INTL/POLI 365 International Political Economy

INTL/ANTH 455 Anthropology of Development and Globalization (INTL 101 prerequisite)

Mass communications

MASC/INTL 151 Communications Technology and Global Society

Political science

POLI 109 Comparative Politics

POLI/INTL 105 International Relations

POLI/INTL 365 International Political Economy

Sociology

SOCY/INTL 330 Global Societies: Trends and Issues

SOCY 430 Politics, Power and Ideology

Approved list J – Human behavior

Anthropology

ANTH/INTL 103 Introduction to Anthropology

ANTH/INTL 348 South American Ethnography (ANTH 103 prerequisite)

ANTH/INTL 349 Rethinking a Continent: Latin America (ANTH 103 prerequisite)

Economics

ECON 101 Introduction to Political Economy

ECON 203 Introduction to Economics

Geography

GEOG 102 Introduction to Human Geography

Homeland security and emergency preparedness

HSEP 101 Homeland Security and Emergency Preparedness

International studies

INTL/ANTH 103 Introduction to Anthropology

INTL/ANTH 348 South American Ethnography (ANTH 103 prerequisite)

INTL/ANTH 349 Rethinking a Continent: Latin America (ANTH 103 prerequisite)

Mass communications

MASC 101 Mass Communications

Psychology

PSYC 101 Introduction to Psychology

Sociology

SOCY 101 General Sociology

SOCY 340 Self and Society

Social science

SOCS 340 Human Sexuality

Women's studies

WMNS 201 Introduction to Women's Studies

Approved list K – Urban environment

All courses designated as "service learning" fulfill this requirement. (See course descriptions in the bulletin for any prerequisites.)

Anthropology

ANTH/GEOG 312 History of Human Settlement

ANTH 450/ENGL 454/INTL 454 Cross-cultural Communication

Criminal justice

CRJS 181 Justice System Survey

CRJS 305 Policing Theories and Practice

CRJS 352 Crime and Delinquency Prevention

CRJS 468 Economic and Organized Crime

CRJS 491 Topic: Youth in Corrections/Service Learning (only this topic)

Economics

ECON/URSP 321 Urban Economics

English

ENGL 454/INTL 454/ANTH 450 Cross-cultural Communication

Environmental science

ENVS 491 Topics in Environmental Studies: Ecology of Urban Environments (only this topic)

French

FREN 301 Advanced Grammar and Writing

Foreign language

FRLG 345/URSP 350/INTL 345 Great Cities

of the World

FRLG 490 Foreign Languages Urban Internship

Geography

GEOG/URSP 302 Land Use Capability

GEOG/URSP 306 Urban Economic Geography

GEOG/ANTH 312 History of Human Settlement

GEOG/INTL/URSP 340 World Cities Outside of North America

Humanities and sciences

HUMS 391 Science Education in the Urban Environment (only this topic)

International studies

INTL/URSP/GEOG 340 World Cities Outside of North America

INTL 345/FRLG 345/URSP 350 Great Cities

of the World

INTL 454/ANTH 450/ENGL 454 Cross-cultural Communication

Mass communications

- MASC 303 General Assignment Reporting
- MASC 403 Advanced Reporting
- MASC 404 Specialized Project Reporting
- MASC 439 Public Relations Campaigns
- MASC 464 Electronic Media Writing III

Physics

- PHYS 291 Topics in Physical Science: Physics Outreach - Richmond Elementary Schools (only this topic)

Political science

- POLI 321 City Politics

Psychology

- PSYC 491 Topics in Psychology: Youth in Corrections/Service Learning (only this topic)
- PSYC 493 Fieldwork: Urban Environment (only this topic)
- PSYC 493 Fieldwork: Mentoring Children at Risk (only this topic)

Social work

- SLWK 422 Social Welfare Legislation and Services

Sociology

- SOCY 302 Contemporary Social Problems
- SOCY 327 Urban Sociology
- SOCY 391 Topics in Sociology: Youth in Corrections/Service Learning (only this topic)

Spanish

- SPAN 402 Language Issues in the Spanish-speaking World

Urban studies

- URSP 116 Introduction to the City
- URSP 245 Housing and Community Revitalization
- URSP 261 Design of the City
- URSP/GEOG 302 Land Use Capability
- URSP 304 Urban Social Systems
- URSP/GEOG 306 Urban Economic Geography
- URSP 315 The Evolution of American Cities
- URSP 316 Urban Life in Modern America
- URSP/ECON 321 Urban Economics
- URSP/GEOG/INTL 340 World Cities Outside of North America
- URSP 350/INTL 345/FRLG 345 Great Cities of the World

Approved lists – Students entering prior to fall 1997

See the VCU Undergraduate Bulletin 2003-04 for the final approved list for students entering VCU prior to fall 1997.

Humanities and Sciences Undeclared Program

Exploratory programs for students with an undeclared major

Seth Sykes

- Director of Academic Advising (2000)
- B.D. 1988 University of St. Andrews, Scotland
- Th.M. 1989 Princeton Theological Seminary
- Ph.D. 1997 Union Theological Seminary

For those students seeking admission to VCU who have not declared their major at the time of their acceptance or enrollment, the university recommends enrollment in the College of Humanities and Sciences. Students admitted into the “Humanities and Sciences Undeclared” category are encouraged to select a major by the end of two years of study. Students must declare a major within one of the university’s schools no later than the semester in which they complete 60 credits. The advising program is flexible enough to suit the interests of any student with an undeclared major, yet the courses recommended are basic to a variety of majors.

The student with an undeclared major is assigned an adviser in the Office of Academic Advising with whom the student must meet at least once prior to advanced registration each semester. Adviser and student assess the general academic direction of the student’s interests and then plan a program of studies to assist the student in defining his or her academic objectives more clearly.

As students who have not declared their majors begin to make decisions about a major, they should consult this bulletin for that major’s specific course requirements that should be taken in the freshman and sophomore years.

Undergraduate credit by examination

Recognizing that VCU enrolls students of varying backgrounds and experiences, the college provides students limited opportunities to accelerate their education through “credit by examination.” A full description of this program appears in the “Admission to the University” chapter of this bulletin.

University Honors Program

The VCU Honors Program, a challenging and exciting program with high academic standards, was established to meet the needs of academically talented undergraduate students. The University Honors Program offers students the opportunity to expand their creative and intellectual horizons. Students in this program benefit from small classes that promote greater interaction between students and faculty, and among the students themselves.

Undergraduates from the college and all other schools on VCU’s Monroe Park Campus

are invited to apply to this program, if they meet eligibility requirements. For a detailed description of qualifications and requirements, see the “Admission to the University” chapter of this bulletin.

Course descriptions and numbering

Courses designated 100 and 200 are undergraduate lower-level courses offered primarily to undergraduate students; 300 and 400 courses are undergraduate upper-level courses designed for advanced undergraduates.

Courses at the 500 level are open to advanced undergraduate students with the consent of the department offering the course. Credit is applicable to only one degree.

Department of African American Studies

M. Njeri Jackson

- Associate Professor of Political Science, Public Administration and African American Studies, and Director (1990)
- B.A. 1976 Georgia State University
- M.A. 1982 Atlanta University
- Ph.D. 1987 Atlanta University

The Bachelor of Arts in African American Studies gives students the opportunity to pursue a liberal education consistent with their intellectual interests and career goals. This program prepares students for graduate studies in African American studies and other fields. African American studies majors interested in teaching careers. African American studies majors interested in teaching careers at the middle school level can enroll in the Extended Teacher Preparation Program provided they have fulfilled the requirements of a minor in any of the sciences, mathematics, English, history or political science. Eligibility to teach at the secondary level requires African American studies majors to complete a second liberal arts major in the subject they plan to teach.

Degree requirements – Bachelor of Arts in African American Studies

Students majoring in African American studies must meet the general education requirements of the College of Humanities and Sciences.

States, Europe and Africa will be covered with special emphasis on the study of documents and artifacts related to the emergence and present state of the modern world. Students will participate in field research.

HIST 461-462 Archival and Historical Administration

Continuous courses; 3 lecture and 3 workshop hours. 3-3 credits. First semester: an examination of the development of archival administration with emphasis on modern techniques and practices of archival and historical administration. Second semester: workshop in which each student will receive on-the-job training in various phases of archival administration.

HIST 483 Museum Methods

Semester course; 3 lecture hours. 3 credits. Practical presentation of techniques of working museums, presented in conjunction with local or regional museums.

HIST 485 Seminar in Historiography

Semester course; 3 lecture hours. 3 credits. May be repeated for maximum of 6 credits with different topics. Introduction to questions in historiography, meaning, methodology and interpretation in the teaching and writing of history.

HIST 486 Seminar in Historical Methodology

Semester course; 3 lecture hours. 3 credits. In a seminar setting involving reading, discussion and writing, students will explore the canons, practices, and limitations of one or more historical methodologies. Since the emphasis may shift from semester to semester, interested students should contact the instructor listed in the current Schedule of Classes.

HIST 490 Seminar in History

Semester course; 3 lecture hours. 3 credits. Maximum of 9 credits. Research and analysis of a selected historical topic in a seminar setting. See the Schedule of Classes for specific topics to be offered each semester.

HIST 492 Independent Study

Semester course; variable hours. 2-4 credits per semester. Maximum total of 6 credits. Open generally to students of only junior and senior standing who have acquired 12 credits in the departmental disciplines. Determination of the amount of credit and permission of instructor and department chair must be procured prior to registration of the course.

HIST 493 Internship

Semester course; variable hours. 2-4 credits per semester. Maximum total of 6 credits. Open generally to students of senior standing. Students receive credit for work on historical projects with approved agencies. Determination of the amount of credit and permission of departmental internship coordinator must be procured prior to registration for the course.

Courses in humanities and sciences (HUMS)

HUMS 100 Intensified Problem Solving in Chemistry 100

Semester course; 4 workshop hours. 2 credits. Prerequisite: Students must be eligible to take MATH 131 or higher. Corequisite: CHEM 100. Problem-solving sessions will engage students in cooperative learning in open discussions of the elementary principles of chemistry. Students work on chemistry problems in small groups in which each student participates in the presentation

of problem solutions to the class. Students receive mock quizzes and exams and will be given assistance on homework problems assigned in their chemistry lecture. This course is for students who do not meet the criteria for enrollment in CHEM 101. These credits may not be used to satisfy any chemistry course requirements in the College of Humanities and Sciences.

HUMS 101 Intensified Problem Solving in Chemistry 101

Semester course; 4 workshop hours. 2 credits. Prerequisite: CHEM 100 with a grade of "C" or higher or a satisfactory score on the Chemistry Placement Test. Students must be eligible to take MATH 151 or higher. Corequisite: CHEM 101. Problem-solving sessions will encompass the fundamental principles and theories of chemistry. Students will form and work in small study groups and must participate in open discussions of the concepts of chemistry. Each student participates in the presentation of problem solutions to the class. Students will receive mock quizzes and exams and will be given assistance on homework problems assigned in the general chemistry lecture. These credits may not be used to satisfy any chemistry course requirements in the College of Humanities and Sciences.

HUMS 102 Intensified Problem Solving in Chemistry 102

Semester course; 3 workshop hours. 2 credits. Prerequisite: CHEM 101 with a grade of "C" or higher, MATH 151 or higher. Corequisite: CHEM 102. Problem-solving sessions will encompass the fundamental principles and theories of chemistry. Students will form and work in small study groups where they engage in cooperative learning and must participate in open discussions of the concepts of chemistry. Each student participates in the presentation of problem solutions to the class. Students will receive mock quizzes and exams and will be given assistance on homework problems assigned in the general chemistry lecture. These credits may not be used to satisfy any chemistry course requirements in the College of Humanities and Sciences.

HUMS 291 Special Topics in the Humanities and Sciences

Semester course; 1-4 credits. May be repeated with different content. Specialized topics in the liberal arts and sciences designed to provide an overview of a topic not provided by an existing course or program. May be multidisciplinary. Graded as pass/fail or normal letter grading at the option of the instructor.

HUMS 391 Special Topics in the Humanities and Sciences

Semester course; variable hours. 1-4 credits. May be repeated with different content. Specialized topics in the liberal arts and sciences designed to provide an overview of a topic not provided by an existing course or program. May be multidisciplinary. Graded as pass/fail or normal letter grading at the option of the instructor.

Courses in humanities and sciences interdisciplinary (HUSI)

HUSI 190 College Seminar

1 lecture hour. 1 credit. May be repeated once for credit. Open only to students who participate in these programs. A seminar designed for first-year programs coordinated through the office of the dean of the College of Humanities and Sciences. Designed to help students integrate general education courses.

HUSI 491 College Topics

Semester course; 3 lecture hours. 3 credits. May be repeated with different topics for maximum of 6 credits. Open primarily to seniors; others with permission of instructor. A discussion of complex issues that are of enduring value or of critical interest to society. The goals of the course are to (1) bring general principles from disciplinary or a variety of disciplinary contexts to bear on specific problems; (2) exercise critical thinking; (3) understand and integrate diverse perspectives; and (4) explore models of decision making, underlying assumptions and implications. See the Schedule of Classes for specific topics to be offered each semester.

Courses in life sciences (LFSC)

For life sciences course descriptions, refer to the "VCU Life Sciences" chapter in this bulletin.

Department of Mathematics and Applied Mathematics

Andrew M. Lewis

Associate Professor and Department Chair (1994)
B.A. 1967 Harvard University
Ph.D. 1993 University of California at Berkeley

The curriculum in mathematical sciences promotes understanding of the mathematical sciences and their structures, uses and relationships to other disciplines. To this end, the scholarly growth of the faculty and students in the mathematical sciences is nurtured through study, research and a high standard of teaching. The curriculum provides a sound foundation for the student seeking to enter a career with a technological orientation or for the student who wishes to pursue graduate study in applied mathematics, mathematics, operations research, statistics, mathematics teaching in secondary schools or related fields.

A Bachelor of Science is offered jointly by the Department of Mathematics and Applied Mathematics and the Department of Statistical Sciences and Operations Research. In the Department of Mathematics and Applied Mathematics, students pursuing the Bachelor of Science in Mathematical Sciences can choose from one of the following concentrations:

1. Mathematical sciences/applied mathematics – concentrates on the analytical and computational techniques necessary to solve many of today's problems. These methods traditionally had been applied in such areas as chemistry and physics, but now are applied in many other areas.

2. Mathematical sciences/mathematics – fosters the understanding of the power and the beauty of pure mathematics and its applications to various branches of knowledge.
3. Mathematical sciences/secondary teacher preparation – prepares students for teaching mathematics in the secondary schools.

As an alternative to the above concentrations, students may design an individual plan of study with the help of their advisers.

Degree requirements – Bachelor of Science in Mathematical Sciences

The B.S. in Mathematical Sciences requires a minimum of 120 credits with at least 41 of those in courses labeled MATH, STAT or OPER. Along with the general education requirements of the College of Humanities and Sciences and the undergraduate requirements, students must take core courses and fulfill specific requirements for the degree.

Based on the results of the placement process, students may be required to take MATH 151 Precalculus Mathematics. No more than one course in mathematics (MATH) at the 100 level can count for the general requirements toward the Bachelor of Science degree. Credit for 100-level mathematical sciences courses cannot be applied toward the mathematical sciences courses required for the major in mathematical sciences.

Mathematical sciences majors must complete the following requirements:

- A. Complete one of the following sequences:
 1. BIOL 151 and 152 and BIOZ 151L and 152L Introduction to Biological Science and Laboratory I and II
 2. CHEM 101-102 and CHEZ/FRSZ 101L and 102L General Chemistry and Laboratory I and II
 3. PHYS 207 and 208 University Physics I and II or PHYS 201-202 General Physics
- B. Complete another course, including laboratory, in the natural sciences from the list of courses approved for satisfying the general education requirements of the College of Humanities and Sciences. This course must be in the life sciences if the chemistry or physics sequence was selected in A above. It must be in the physical sciences if the biology sequence was selected in A above.
- C. Complete one other course in the natural sciences or complete a minor or second major offered outside the Department of Mathematics and Applied Mathematics.

Completion of the previously mentioned requirements will satisfy the College of Humanities and Sciences natural sciences general education requirements.

Mathematical sciences core. All students are required to take the following courses:
 MATH 200-201 Calculus with Analytic Geometry
 MATH 255 Mathematical Computing
 MATH 300 Introduction to Mathematical Reasoning
 MATH 310 Linear Algebra
 MATH 490 Mathematical Expositions
 STAT 212 Concepts of Statistics

Concentrations. By completing the listed requirements, students may obtain a designation on their transcripts that their study has emphasized one of the following concentrations. Students may choose to meet the requirements of more than one concentration.

1. **B.S. in Mathematical Sciences/applied mathematics**
 MATH 301 Differential Equations
 MATH 512 Complex Analysis for Applications
 MATH 517-518 Methods of Applied Mathematics
 Six additional upper-level credits in mathematical sciences (MATH 302 Numerical Calculus, MATH 437 Applied Partial Differential Equations and MATH 511 Applied Linear Algebra are recommended)
2. **B.S. in Mathematical Sciences/mathematics**
 MATH 501 Introduction to Abstract Algebra
 MATH 507-508 Analysis I-II
 MATH 509 General Topology I
 Six additional upper-level credits in mathematical sciences
3. **B.S. in Mathematical Sciences/secondary mathematics teacher preparation**
 MATH 327 Mathematical Modeling
 MATH 504 Algebraic Structures and Functions
 MATH 505 Modern Geometry
 MATH 507 Analysis I
 MATH 530 The History of Mathematics
 MATH 554 Using Technology in the Teaching of Mathematics

Students who meet the requirements for two of the concentrations within the mathematical sciences curriculum can receive a double major. To initiate a double major, students must obtain the appropriate form from the Office of Records and Registration.

With the approval of the departmental Undergraduate Credentials Committee and the adviser, students can design their own plan of study, which also will result in a Bachelor of Science in Mathematical Sciences. This student-planned curriculum must contain at least 24 credits in upper-level (300-500) mathematical sciences courses.

Minor requirements – general

A minimum GPA of 2.0 must be achieved in the minor, and credit for 100-level mathematical sciences courses cannot be applied to the minor. Students in the mathematical sciences majors cannot minor in a mathematical sciences program.

Minor in mathematical sciences

A minor in mathematical sciences consists of at least 18 credits offered by the Department of Mathematics and Applied Mathematics and the Department of Statistical Sciences and Operations Research, including a minimum of three credits of calculus and nine upper-level credits. Neither STAT 208, STAT 210 nor any 100-level course may be used to fulfill the required 18 credits.

Postbaccalaureate programs in mathematical sciences

For more information about these programs, refer to the Graduate Bulletin online.

Second baccalaureate degree

For students possessing a bachelor's degree and wishing to gain undergraduate preparation in an area of mathematical sciences, second baccalaureate degrees are offered through the department. For detailed information about these programs, refer to the "Academic Regulations and General Degree Requirements" chapter of this bulletin.

Cooperative Education Program

The Cooperative Education Program is available to qualifying students pursuing undergraduate degrees in mathematical sciences. For a full description of this program, refer to the "Division of Student Affairs and Enrollment Services" chapter of this bulletin.

Courses in mathematics (MATH)

Students registering for CMSC 201, 255 or MATH 131, 141, 151, 200, 211, 300 or STAT 208 or 210 must have taken the VCU Mathematics Placement Test within the one-year period immediately preceding the beginning of the course. An exception to this policy is made in the case in which the stated alternative prerequisite course has been completed at VCU. Credit for no more than one course

may be earned from among MATH 101, MATH 111/MGMT 111, MATH 141.

MATH 001 Elementary Algebra

Semester course; 3 lecture or 3 laboratory/tutorial hours. No credit. Prerequisite: Permission of the department chair. The purpose of this course is to provide laboratory and tutorial instruction for those seeking remediation or review of high school algebra. Topics include basic properties of real numbers, operations with algebraic expressions, solution of equations and inequalities, exponents and radicals, introduction to functions and graphing.

MATH 131 Introduction to Contemporary Mathematics

Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 001 or satisfactory score on the VCU Mathematics Placement Test within the one-year period immediately preceding the beginning of the course. An exception to this policy is made in the case where the stated alternative prerequisite course has been completed at VCU. Topics include optimization problems; data handling; growth and symmetry; and mathematics with applications in areas of social choice. Major emphasis is on the process of taking a real-world situation, converting the situation to an abstract modeling problem, solving the problem and applying what is learned to the original situation. Serves as a prerequisite for STAT 208 or 210, but does not serve as a prerequisite for MATH 151 or other advanced mathematical sciences courses.

MATH 141 Algebra with Applications

Semester course; 3 lecture hours. 3 credits. Prerequisites: one year of high school algebra and satisfactory score on the VCU Mathematics Placement Test within the one-year period immediately preceding the beginning of the course. An exception to this policy is made in the case where the stated alternative prerequisite course has been completed at VCU. Topics include sets, functions, exponents, logarithms, matrix algebra, systems of linear equations, inequalities, binomial theorems, sequences, series, complex numbers and linear programming.

MATH 151 Precalculus Mathematics

Semester course; 3 lecture and 1 mathematics laboratory/recitation hours. 4 credits. Prerequisite: MATH 141 or satisfactory score on the VCU Mathematics Placement Test within the one-year period immediately preceding the beginning of the course. An exception to this policy is made in the case where the stated alternative prerequisite course has been completed at VCU. Concepts and applications of algebra and trigonometry. Topics include graphics, transformations and inverses of functions; linear, exponential, logarithmic, power, polynomial, rational and trigonometric functions.

MATH 191 Topics in Mathematics

Semester course; 1-3 credits. May be repeated for credit. A study of selected topics in mathematics. For a course to meet the general education requirements it must be stated in the Schedule of Classes. See the Schedule of Classes for specific topics to be offered each semester and prerequisites.

MATH 200-201 Calculus with Analytic Geometry

Continuous courses; 4 lecture hours. 4-4 credits. Prerequisite for MATH 200: MATH 151 or satisfactory score on the VCU Mathematics Placement Test (algebra section) within the one-year period immediately preceding the beginning of the course. An exception to this policy is made in the case where the stated alternative prerequisite course has been completed at VCU.

Prerequisites for MATH 201: MATH 200. Limits, continuity, derivatives, differentials, antiderivatives and definite integrals. Applications of differentiation and integration. Selected topics in analytic geometry. Infinite series.

MATH 211 Mathematical Structures

Semester course; 3 lecture hours. 3 credits. Prerequisite: Calculus-level placement on the VCU Mathematics Placement Test within the one-year period immediately preceding enrollment in the course or MATH 151 or MGMT 212. An alternative prerequisite course may be approved at the discretion of the academic adviser. An introduction to mathematical logic and set theory, including applications in Boolean algebras and graph theory.

MATH 255 Introduction to Computational Mathematics

Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 201. (A core course for mathematics/applied mathematics majors.) An introduction to computer algebra systems (CAS) and their use in mathematical, scientific and engineering investigations/computations. Introductory mathematical computer programming using a CAS, including implementation of problem-specific algorithms.

MATH 291 Topics in Mathematics

Semester course; 1-3 credits. May be repeated for credit. A study of selected topics in mathematics. See the Schedule of Classes for specific topics to be offered each semester and prerequisites.

MATH 300 Introduction to Mathematical Reasoning

Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 201. (A core course for mathematics/applied mathematics majors.) An introduction to basic concepts of mathematical reasoning and the writing of proofs in an elementary setting. Direct, indirect and induction proofs. Illustrations of the concepts include basic proofs from mathematical logic, elementary set theory, elementary number theory, number systems, foundations of calculus, relations, equivalence relations, functions and counting with emphasis on combinatorial proofs.

MATH 301 Differential Equations

Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 201. Solutions of ordinary differential equations of first order. Solutions of higher order linear differential equations with constant coefficients and variable coefficients by the methods of undetermined coefficients and variation of parameters, solutions by Laplace transforms and applications.

MATH 302 Numerical Calculus

Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisites: CMSC 201 or demonstrated knowledge of FORTRAN and MATH 201. An introduction to numerical algorithms for solving systems of linear equations, finding zeroes, definite integration, minimization, etc. Those features of FORTRAN that affect the precision of numerical computations will be included.

MATH 303 Investigations in Geometry

Semester course; 2 lecture and 3 laboratory hours. 3 credits. Prerequisites: MATH 131 and STAT 208, STAT 210 or STAT 212. A study of topics in Euclidean geometry to include congruence, similarity, measurement, coordinate geometry, symmetry and transformation in both two and three dimensions.

These topics will be investigated using manipulatives and computer software. May be used for credit toward the degree by mathematical sciences majors; but does not count toward the 24 upper-level mathematical sciences credits required for these majors.

MATH 305 Elementary Number Theory

Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 300. Divisibility, congruences, Euler phi-function, Fermat's Theorem, primitive roots, Diophantine equations.

MATH 307 Multivariate Calculus

Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 201. The calculus of vector-valued functions and of functions of more than one variable. Partial derivatives, multiple integrals, line integrals, surface integrals and curvilinear coordinates. Lagrange multipliers; theorems of Green, Gauss and Stokes. Applications.

MATH 309/STAT 309 Introduction to Probability Theory

Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 201. Completion of MATH 211 or MATH 300 (or equivalent knowledge) is strongly recommended. A study of the mathematical theory of probability, including finite and infinite sample spaces, random variables, discrete and continuous distributions, mathematical expectation, functions of random variables and sampling distributions.

MATH 310 Linear Algebra

Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 200, and MATH 300 or MATH 201. Systems of linear equations, vector spaces, linear dependence, bases, dimensions, linear mappings, matrices, determinants, quadratic forms, orthogonal reduction to diagonal form, eigenvalues and geometric applications.

MATH 327/OPER 327 Mathematical Modeling

Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 200. Fundamental concepts of mathematical modeling. Topics may include differential equation models, optimization models and probabilistic models. Practical problems will be discussed throughout.

MATH 351 Applied Abstract Algebra

Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 300. A survey of several areas in applied abstract algebra which have applications in computer science such as groups, codes, matrix algebra, finite fields and advanced graph theory.

MATH 361 Numbers and Operations

Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 131 or satisfactory score on the VCU Mathematics Placement Test within the one-year period immediately preceding the beginning of the course. Ways of representing numbers, relationships between numbers, number systems, the meanings of operations and how they relate to one another, and computation within the number systems as a foundation for algebra. Structured observations and tutoring of elementary-level students. Restricted to B.I.S. students majoring in liberal studies concentration for early and elementary education.

MATH 391 Topics in Mathematics

Semester course; 1-3 credits. May be repeated for credit. A study of selected topics in mathematics. See the Schedule of Classes for specific topics to be offered each semester and prerequisites.

MATH 437 Applied Partial Differential Equations

Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 301 and MATH 307. Parabolic (heat), hyperbolic (wave), and elliptic (steady-state) partial differential equations are studied. Solution techniques are demonstrated, including separation of variables and integral transforms. Practical problems and applications are emphasized.

MATH 490 Mathematical Expositions

Semester course; 2 lecture hours. 2 credits. Prerequisites: ENGL 200 and nine credits in mathematics courses at the 300 level or above. Required for mathematics and applied mathematics tracks within B.S. in mathematical sciences. Designed to help students attain proficiency in expository mathematical writing and in oral presentations, which require the efficient and effective use of mathematics and the English language. Students will learn a variety of topics in mathematics and will write reviews of selected award-winning mathematics papers.

MATH 492 Independent Study

Semester course; variable hours. 2, 3 or 4 credits per semester. Maximum 4 credits per semester; maximum total of 6 credits. Generally open to students of only junior or senior standing who have acquired at least 12 credits in the departmental discipline. Determination of the amount of credit and permission of instructor and department chair must be procured prior to registration of the course. The student must submit a proposal for investigating some area or problem not contained in the regular curriculum. The results of the student's study will be presented in a report.

MATH 493 Mathematical Sciences Internship

Semester course; the equivalent of at least 15 work hours per week for a 15-week semester. 3 credits. Mathematical sciences majors only with junior or senior standing. Admission by permission from the department chair. Through placement in a position in business, industry, government or the university, the student will serve as an intern in order to obtain a broader knowledge of the mathematical sciences and their applications.

MATH 501 Introduction to Abstract Algebra

Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 300 and MATH 310, or their equivalents. An introduction to groups, rings and fields from an axiomatic point of view. Coset decomposition and basic morphisms.

MATH 505 Modern Geometry

Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 300, and MATH 307 or MATH 310. Topics in Euclidean, projective and non-Euclidean geometries from a modern viewpoint.

MATH 507-508 Analysis I-II

Continuous courses; 3 lecture hours. 3-3 credits. Prerequisites: MATH 300, MATH 307 and MATH 310, or permission of instructor. Theoretical aspects of calculus, sequences, limits, continuity, infinite series, series of functions, integration, differential geometry.

MATH 509-510 General Topology I-II

Continuous courses; 3 lecture hours. 3-3 credits. Prerequisites: MATH 300 and MATH 307. Foundations and fundamental concepts of point-set topology. Topological spaces, convergence, connected sets, compactness, product spaces, quotient spaces, function spaces, separation properties, metrization theorems, mappings and compactifications.

MATH 511 Applied Linear Algebra

Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 310. The algebra of matrices, the theory of finite dimensional vector spaces and the basic results concerning eigenvectors and eigenvalues, with particular attention to applications.

MATH 512 Complex Analysis for Applications

Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 307, and MATH 300 or knowledge equivalent to MATH 300. The algebra and geometry of complex numbers, analytic functions, integration, series, contour integration, analytic continuation, conformal mapping, with particular attention to applications.

MATH 515 Numerical Analysis I

Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 310, or MATH 201 and MATH 185. Knowledge of a programming language recommended. Solutions of equations, interpolation and approximation, numerical integration, iterative methods for solving linear equations, calculation of eigenvalues and eigenvectors. Selected algorithms may be programmed for solution on computers.

MATH 516 Numerical Analysis II

Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 515. Numerical solution of initial value problems in ordinary differential equations, two-point boundary value problems. Introduction to numerical techniques for solving partial differential equations. Selected algorithms may be programmed for solution on computers.

MATH 517-518 Methods of Applied Mathematics

Continuous courses; 3 lecture hours. 3-3 credits. Prerequisites: MATH 301, MATH 307 and MATH 300 or knowledge equivalent to MATH 300. Vector analysis, matrices, complex analysis, special functions, Legendre and Hermite polynomials. Fourier series, Laplace transforms, integral equations, partial differential equations, boundary-value and initial-value problems.

MATH 520/OPER 520 Game Theory and Linear Programming

Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 310. The mathematical basis of game theory and linear programming. Matrix games, linear inequalities and convexity, the mini-max theorems in linear programming, computational methods and applications.

MATH 521 Introduction to Algebraic Number Theory

Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 501. Introduction to algebraic numbers and algebraic number fields with emphasis on quadratic and cyclotomic fields. Units, primes, unique factorization.

MATH 525 Introduction to Combinatorial Mathematics

Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 300 and MATH 310, or permission of instructor. Introduction to the problems and methods of solution in the enumeration, existence and construction of some discrete mathematical structures. Discussion of generating functions, recurrence relations, Ramsey's theorem, matching theory, combinatorial designs, Latin squares and linear coding theory.

MATH 530 The History of Mathematics

Semester course; 3 lecture hours. 3 credits. Prerequisites: 17 credits at the 200 level or above in mathematical

sciences or permission of instructor. Surveys major trends in the development of mathematics from ancient times through the 19th century and considers the cultural and social contexts of mathematical activity. Either MATH 530 or MATH 531 (but not both) may be applied to the M.S. in Mathematical Sciences or Computer Science. Both MATH 530 and MATH 531 may be applied to the M.Ed. in Curriculum and Instruction with a concentration in secondary education/mathematics.

MATH 531 Expositions in Modern Mathematics

Semester course; 3 lecture hours. 3 credits. Prerequisite: Six credits at the 400 level or above in mathematical sciences. Studies descriptively several major ideas relevant to present-day mathematics, such as the advent of pure abstraction, difficulties in the logical foundations of mathematics, the impact of mathematics and statistics in the 20th century, and the computer revolution. Either MATH 530 or MATH 531 (but not both) may be applied to the M.S. in Mathematical Sciences or Computer Science. Both MATH 530 and MATH 531 may be applied to the M.Ed. in Curriculum and Instruction with a concentration in secondary education/mathematics.

MATH 532 Ordinary Differential Equations I

Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 301 and 310 or the equivalent. MATH 507 is recommended. Existence and uniqueness for systems, linear systems, fundamental matrix solutions, matrix exponential, nonlinear systems, plane autonomous systems and introduction to stability.

MATH 555/ENGR 555 Dynamics and Multivariable Control I

Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 301 and 310 or the equivalent. Systems of differential equations with controls, linear control systems, controllability, observability, introduction to feedback control and stabilization.

MATH 591 Topics in Mathematics

Semester course; 1-3 credits. May be repeated for credit with different topics. Prerequisite: Permission of the instructor. Open to qualified undergraduates. A study of selected topics in mathematical sciences. See the Schedule of Classes for specific topics to be offered each semester and prerequisites.

Military Science and Leadership

Major Stanley Jones

Director (2003)

B.A. 1989 Loyola University, Chicago

The military science curriculum teaches the principles of management and leadership as a foundation for civilian and military careers. Graduates of this program are eligible for appointments as commissioned officers in the U.S. Army, the U.S. Army Reserve or Army National Guard.

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