

# College of Sciences

Web Site: <http://sci.odu.edu>

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The College of Sciences degree programs are designed to prepare students for careers in the sciences or to lay broad foundations for specialized training in these fields of knowledge.

The college is comprised of the Departments of Biological Sciences, Chemistry and Biochemistry, Computer Science, Mathematics and Statistics, Ocean, Earth and Atmospheric Sciences, Physics, and Psychology. The Departments of Biological Sciences, Chemistry and Biochemistry, Mathematics and Statistics, Ocean, Earth and Atmospheric Sciences, and Physics cooperate with the Darden College of Education and Professional Studies to provide the necessary courses for certification to teach in the Commonwealth.

## Undergraduate Degree Requirements for all Majors in the College of Sciences

### Core Requirements

Fulfilling the University General Education Requirements for a specific program satisfies the degree requirements for the College of Sciences. Refer to the University General Education section of this Catalog for details about which courses satisfy the skills, ways of knowing, and upper-division requirements of the General Education program.

Additional major requirements are listed under the various departmental programs.

### General Requirements

1. Students wishing to take a major or a minor in the College of Sciences must declare with the appropriate department.
2. The College of Sciences allows a maximum of four hours of activity credit to be applied toward any degree granted by the college. Activity credit beyond the four-hour maximum may be permitted in unusual circumstances with the written approval of the dean of the college. Activity credit required by a student's major department will not be counted toward the credit limitation. (See the Catalog section on Activity Credits for the definitions and other restrictions on activity course credits.)

## College of Sciences Degree Programs

### Health-Related Sciences

Subject	BS	MS	PhD
Biomedical Science			X <sup>1</sup>
Biological Chemistry Track			X <sup>1</sup>
Clinical Psychology			X <sup>3</sup>

### Life Sciences

Subject	BS	MS	PhD
Biology	X	X	X <sup>4</sup>
Biochemistry	X	X <sup>2</sup>	X <sup>10</sup>
Psychology	X	X	X <sup>5</sup>

### Physical Sciences

Subject	BS	MS	PhD
Chemistry	X	X	X
Computer Engineering		X <sup>8</sup>	X <sup>8</sup>

Computer Science X		X	X
Computer Science (Computer Information Sciences)		X <sup>9</sup>	
Mathematics	X	X <sup>6</sup>	X <sup>7</sup>
Ocean and Earth Science	X	X	
Oceanography			X
Physics	X	X	X

1. Ph.D. in biomedical sciences is an interdisciplinary degree program based in the College of Sciences. Tracks include general biomedical sciences and biological chemistry.
2. Emphasis area within chemistry master's degree program.
3. Doctor of Philosophy (Ph.D.) offered through the Virginia Consortium Program in Clinical Psychology, sponsored by Eastern Virginia Medical School, Norfolk State University, and Old Dominion University.
4. Ecological sciences. Optional dual degree program with master's degree in computational and applied mathematics with emphasis in statistics. Training opportunities are available with faculty in the Departments of Biological Sciences, Chemistry and Biochemistry, and Ocean, Earth and Atmospheric Sciences.
5. Applied experimental, human factors, industrial/organizational psychology or clinical psychology.
6. Computational and applied mathematics, with emphases in applied mathematics and statistics/biostatistics.
7. Computational and applied mathematics, with emphases in applied mathematics, statistics and biostatistics.
8. Offered jointly with the College of Engineering and Technology.
9. Offered jointly with the Strome College of Business.
10. Emphasis area within chemistry Ph.D. program.

## Old Dominion University/Eastern Virginia Medical School Joint Program in Medicine

The joint program in medicine is designed to encourage highly qualified students to receive a B.S. from Old Dominion University and an M.D. from Eastern Virginia Medical School. Students apply after completion of their freshman year at Old Dominion University. Upon successful completion of requirements and graduation from Old Dominion University, a student accepted in the ODU/EVMS Joint Program in Medicine will be guaranteed admission to Eastern Virginia Medical School.

### Eligibility and Selection of Students for the Program

1. Applications will be accepted from students without regard to state of residency.
2. Students apply for the program at the beginning of their sophomore year at Old Dominion. A joint committee of ODU/EVMS faculty reviews and selects applicants for this program with approval by the Committee on Admissions at EVMS. EVMS accepts only U.S. citizens and Permanent Residents in their medical program.
3. Criteria for the program include a combined Math and Verbal Scholastic Aptitude Test minimum score of 1250 (ACT 28) and an overall and science GPA from ODU of at least 3.40 at the time of application. Students who do not meet these minimum requirements will not be considered for the program.
4. It is recommended that students complete one year of general chemistry and the first semester of organic chemistry by the end of the first semester of their sophomore year.
5. Students selected for the joint program are required to take the MCAT and attain a minimum combined score at or above 503 (61st percentile) for admission to EVMS.

6. Sophomores at Old Dominion will apply through the Prehealth Advisory Committee, room 236 in the Mills Godwin building. Applications will be received and reviewed by that committee. Based upon academic records, including SAT scores, and non-academic factors such as volunteerism, leadership, and health care exposure, students will be nominated for the program.
7. Qualified applicants will be interviewed by members of a joint Old Dominion University/Eastern Virginia Medical School faculty committee.
8. To guarantee their positions at Eastern Virginia Medical School, students in this program should maintain an overall and science grade point average of 3.25. Also, a student in this program must receive satisfactory annual reviews from a faculty committee at Old Dominion University and participate in seminars, classes, and medical and/or research experiences associated with the program. A student will be dropped from the program if found guilty of violating the Honor Code, or if the recommendations of the major advisor and joint committee were not followed. A joint committee of faculty members from Old Dominion University and Eastern Virginia Medical School will annually review the continued eligibility of students in the program.
9. Students in this program must still take the courses required by Eastern Virginia Medical School, i.e. one year of biology, two years of chemistry (including organic chemistry), and one year of physics, and obtain grades of B or better. These courses must be completed at Old Dominion University; all requests to transfer the prerequisite courses from another institution must be approved by the Prehealth Advisory Committee. The Old Dominion University faculty will determine which are the appropriate courses to meet these requirements.
10. Questions about the joint program in medicine should be directed to Reneldo Randall, Director of Advising, College of Sciences, (757) 683-6790.

### Other Advantages of the Program

Because students enrolled in this program will be assured of a position at Eastern Virginia Medical School, they will be encouraged to take courses that meet their interest and needs, rather than courses perceived as necessary to gain entrance into medical school.

Students in this program will be expected to complete the requirements for a baccalaureate degree before beginning medical school.

### Policy for the Awarding of Bachelor's Degrees To Students Attending Professional School in Medically Related Fields

Old Dominion University students attending an accredited medical, dental, pharmacy, or veterinary school without a bachelor's degree shall be given the opportunity of receiving the bachelor's degree in accordance with the prescribed criteria as follows:

1. The student applying for the degree must complete a minimum of 90 semester hours of undergraduate credit prior to attending professional school.
2. The student must fulfill the General Education requirements of the University and the College of Sciences.
3. Thirty of the last thirty-six hours prior to professional school must be taken at Old Dominion University. A minimum of 12 hours at the 300/400 level in the major program must be taken at Old Dominion University.
4. This policy is applicable to any bachelor's degree offered by Old Dominion University. It must be kept in mind, however, that all departmental requirements must be met either prior to professional school or by using courses taken during the first year of professional school. This latter course of action requires written petition to and approval by the appropriate departmental chair. In either case the student must complete at least two-thirds of the major requirements for the degree prior to attending professional school.
5. The degree is to be awarded only after completion of one year of professional school with acceptable academic performance (to be

determined by a letter from the professional school stating that the student is eligible to matriculate for the second year).

6. The student would apply for the bachelor's degree on completion of one year of professional school. Certification by the appropriate department chair is required as usual.

### Preparation for Pharmacy School

The following courses are recommended for students who wish to complete their pharmacy prerequisites in two years. These courses are particularly designed to meet requirements at the School of Pharmacy of Virginia Commonwealth University, which will accept only students who present at least 65 hours of credit. Students should consult schools of their interest regarding entrance requirements. Recommended courses are:

BIOL 121N	General Biology I	3
BIOL 122N	General Biology I Lab	1
BIOL 123N	General Biology II	3
BIOL 124N	General Biology II Lab	1
CHEM 121N & CHEM 122N & CHEM 123N & CHEM 124N	Foundations of Chemistry I Lecture and Foundations of Chemistry I Laboratory and Foundations of Chemistry II Lecture and Foundations of Chemistry II Laboratory	8
CHEM 211 & CHEM 213	Organic Chemistry Lecture and Organic Chemistry Laboratory	6
CHEM 212 & CHEM 214	Organic Chemistry Laboratory and Organic Chemistry Laboratory	4
ENGL 110C	English Composition	3
Three additional hours in English		3
MATH 162M	Precalculus I	3
MATH 163	Precalculus II	3
MATH 211	Calculus I	4
PHYS 111N	Introductory General Physics	4
PHYS 112N	Introductory General Physics	4
COMM 101R	Public Speaking	3
PHIL 345E	Bioethics	3
Electives (liberal arts and behavioral sciences)		18
Total Hours		74

Contact the Advising Office, College of Sciences, 757-683-6790 for questions concerning preparation for Pharmacy School.

### Prehealth Advisement–Prehealth Advisory Committee

Students seeking careers in medicine, dentistry, osteopathy, optometry, podiatry or veterinary medicine should request advisement as early as possible from the College of Sciences prehealth advisory committee, as well as from their major or other academic advisor. This is to obtain general information of value in gaining acceptance to the professional school of choice, such as how and when to apply for admission, preparation for preprofessional tests and interviews, obtaining letters of evaluation and recommendation, and choosing among the many different schools and professions. Advice is also given on course selection, although only the academic advisor can formally approve these selections.

Students seeking admission to medical, dental and other medically related professional schools should confer with the Prehealth Advisory Committee in their junior year concerning the preparation of letters of evaluation by the Committee.

The chair of the Prehealth Advisory Committee is Terri Mathews, Associate Dean, College of Sciences. To receive prehealth advisement, please contact Reneldo Randall, Associate Chair of the Prehealth Advisory Committee located in MGB 236, (757) 683-6790.

## B.S. to M.B.A. (Master of Business Administration) Linked Program

The linked BS/MBA program is an early entry to the MBA program of study. The early-entry program is designed for well qualified non-business undergraduate ODU students to start their MBA program prior to completing their undergraduate degree. Well qualified non-business undergraduate students may take MBA-level courses as early as three semesters prior to graduation and count up to 12 graduate credits toward their undergraduate degree. Students participating in the early-entry program must earn a minimum of 150 credit hours (120 for the undergraduate degree and 30 for the graduate degree). Early-entry program students should carefully consider their undergraduate degree program requirements when planning their course of study. Students in the early-entry program work in close consultation with the MBA Program Office to develop an individualized plan of study based on the required coursework outlined below.

### Admission Requirements

A potential candidate will have:

1. Achieved a minimum Graduate Management Admission Test (GMAT) score of 550
2. Completed all lower-level general education requirements
3. Completed at least 24 credit hours at ODU with a GPA of at least 3.0
4. A minimum index of 1200 (index is computed as 200 times the ODU GPA plus GMAT score)

Students who have done exceptionally well in their undergraduate work may qualify for a GMAT waiver. These candidates will have:

1. Completed all lower-level general education requirements
2. Completed at least 24 credit hours at ODU with a cumulative GPA of at least 3.5
3. Achieved junior standing

### Admissions Procedure

Students interested in the early-entry program should complete the GMAT at least two semesters prior to the semester in which they wish to enroll. Applications to the MBA program should be submitted online following published deadlines in order to begin coursework in the desired semester. When completing the application for admission, students need to select an official admission date that is the semester immediately following their anticipated undergraduate graduation.

Students interested in the program should contact the MBA Program Office as early as possible to discuss their plans for early entry. Once admitted to the program, the MBA program manager will act as the student's co-advisor, along with the chief departmental advisor or chief discipline advisor in the student's undergraduate major. The MBA Program Office is located in 1026 Constant Hall. The phone number is 757-683-3585 and email is mbainfo@odu.edu.

### Requirements for the M.B.A.

Admitted students may begin to complete courses from the MBA pre-core and/or core as soon as three semesters prior to anticipated undergraduate graduation. Twelve graduate credit hours can count toward the undergraduate degree and can meet upper-level General Education requirements. Students will work closely with their undergraduate advisor to confirm what MBA coursework can be used for the fulfillment of their undergraduate degree requirements.

The entire program for a general MBA is 45 credit hours for non-business majors. Courses will be available online and on main campus except for the pre-core, which is only offered online. Those students required to complete the pre-core must complete all pre-core requirements before being allowed to progress to any core courses.

Students must satisfactorily complete:

#### MBA Pre-Core

MBA 600	Introduction to Statistics	1
MBA 601	Introduction to Managerial Economics	1
MBA 602	Introduction to Finance	1
MBA 603	Introduction to Accounting	1
MBA 604	Introduction to Information Management	1

#### MBA Core \*

ACCT 609	Managerial Accounting	2
ACCT 611	Financial Accounting	2
BNAL 606	Statistics for Managers	2
BNAL 610	Fundamentals of Business Analytics	2
ECON 607	Managerial Economics	2
ECON 618	Global Macroeconomics	2
FIN 613	Financial Management	2
FIN 616	Investments and Portfolio Management	2
FIN 619	Business Law and Ethics	2
INBU 620	International Business Issues	2
IT 614	Information and Knowledge Management	2
MGMT 605	Leadership Dynamics	2
MGMT 612	Managing in Contemporary Organizations	2
MGMT 621	Strategic Management	4
MKTG 608	Fundamentals of Contemporary Marketing	2
MKTG 617	Marketing Strategy	2
OPMT 615	Operations & Supply Chain Management	2
Elective Credit Hours		4
Total Hours		45

\* Each core course is offered once per academic year in a specific semester both online and on-campus to maximize opportunity for degree completion, subject to sufficient demand.

### Graduate Writing Proficiency

Students in the MBA program are required to meet the Old Dominion University writing requirement. This can be achieved in one of two ways: (1) earn a raw score of 4.5 or above on the Analytical Writing portion of the GMAT/GRE or (2) successfully complete MBA 621: Effective Business Writing.

### Continuance Policy

To remain in good academic standing after admission to the program, students must maintain a minimum cumulative grade point average of 3.0 in all graduate coursework attempted at the University. Students who fall below this minimum standard will have 12 credit hours to remedy this deficiency.

Further, students may be removed from the program when they earn (1) a grade of C or lower in two courses in the pre-core, or (2) a grade of C or lower in two courses in the core and elective coursework, or (3) a failing grade (F) in any course.

## B.S. to M.P.A. (Master of Public Administration) Linked Program

The linked B.S. to M.P.A. program provides qualified Old Dominion University undergraduate students with the opportunity to earn a master's degree in public administration while taking credits in the M.P.A. program as an undergraduate student. The program is designed for highly motivated students with the desire to immediately continue their education after the bachelor's degree. The program is especially relevant to individuals seeking to work (or currently working) in the public or non-profit sectors, but is suitable for students from any undergraduate major. Graduate courses may be taken during the fall and spring semester of the student's senior undergraduate year. Up to 12 graduate credits can count toward both the undergraduate and graduate degree and can meet upper-level General

Education requirements. After receiving the undergraduate degree, a student will continue with the M.P.A. program, taking M.P.A. courses until completing the required 39 credit hours. Students in the linked program must earn a minimum of 150 credit hours (120 for the undergraduate degree and 30 for the graduate degree).

## Admission Requirements

A potential candidate will have:

1. Completed all lower level general education requirements
2. Achieved a cumulative GPA of at least 3.0 at the end of the junior year

Requirements for admission to the graduate program can be found in the School of Public Service section of the Graduate Catalog. For additional information, please contact the School of Public Service in the Strome College of Business.

## Research and Service Centers

### Center for Computational Science

The center provides a focus for the University's efforts to perform scientific investigation through large-scale computer models of natural phenomena. It complements the Virginia Modeling, Analysis and Simulation Center, which focuses primarily on the simulation of human-engineered systems, though some underlying methodologies overlap. With close ties to the Department of Energy and NASA laboratories and support from these agencies and NSF, center personnel perform computationally intensive research, develop algorithms and software for high-end parallel computers, train computationally oriented graduate students and post-docs, and disseminate the products of their research, directed scientific results and software libraries, within and beyond the University.

### Center for Molecular Medicine

The Center for Molecular Medicine (CMM) provides a focal point for research in molecular biology, immunology and mammalian molecular genetics supported by peer-reviewed research grants primarily from the National Institutes of Health (NIH) and other sources. Additional areas of research include bioinformatics, systems biology and computational/mathematical biology.

### Commonwealth Center for Coastal Physical Oceanography

The Commonwealth Center for Coastal Physical Oceanography focuses research efforts on major physical processes in the coastal ocean. These processes include continent scale currents, exchange with the open ocean, and effects of global change. Techniques focus on computer modeling and analysis of existing data bases. The center provides advanced computer resources, technical support, and funding for faculty, research associates, and students. Visitors are encouraged to use the facility during either short- or long-term stays.

### Center for Accelerator Science

The Center for Accelerator Science, established in partnership with Thomas Jefferson National Accelerator Facility (Jefferson Lab), aims to meet the nation's need for scientists who will advance the sciences and technologies of particle accelerators and light sources for use in basic science, applied science and industry.

## SCIENCES Courses

### SCI 101. Introduction to the College of Sciences. 1 Credit.

Presents the relationship between majors in the College of Sciences and the student's career goals for students planning to major in a science. Provides an orientation to the University emphasizing the learning skills needed for science majors.

### SCI 195. Topics. 1-3 Credits.

Topics of study that are not offered regularly.

### SCI 302T. The Evolution of Modern Science. 3 Credits.

This course outlines the history of science from Aristotle to the present. Scientific progress has always been coupled with human progress and subject to the politics and culture of the times. Scientists, in most instances, have been in the mainstream of society. But, because of their curiosity and innovation, scientists have often clashed with the prevailing culture. (Cross-listed with HIST 386T). Prerequisite: HIST 100H, HIST 101H, HIST 102H, HIST 103H, HIST 104H, or HIST 105H.

### SCI 395. Special Topics. 1-3 Credits.

Topics of study that are not offered regularly. Prerequisites: permission of the instructor.

### SCI 468. Research Methods in Math and Sciences. 3 Credits.

Emphasizes the tools and techniques used to solve scientific problems. Topics include use and design of experiments, use of statistics to interpret experimental results, mathematical modeling of scientific phenomena, and oral and written presentation of results. Students will perform four independent inquiries, combining skills from mathematics and science to solve research problems. Prerequisites: BIOL 307, BIOL 308 or BIOL 315 OR CHEM 321 OR MATH 212 OR OEAS 306 or OEAS 310 OR PHYS 232N.

### SCI 495. Topics. 1-3 Credits.

Topics that are not offered regularly. Prerequisites: permission of the instructor.