A. JAMES CLARK SCHOOL OF ENGINEERING

3110 Jeong H. Kim Engineering Building
301-405-8335
www.eng.umd.edu

Dean: Darryll Pines
Associate Deans: Ken Kiger, Hugh Bruk, Robert Brisber, Ankur Srivastava

The University of Maryland’s A. James Clark School of Engineering is a premier program, ranked among the top 20 in the world. Located just a few miles from Washington, D.C., the Clark School is at the center of a constellation of high-tech companies and federal laboratories, offering students access to unique opportunities to prepare for and launch rewarding careers.

We combine rigorous classroom learning with opportunities for hands-on educational experiences, including the autonomous vehicle project in freshman year and capstone courses in junior and senior years; participation in numerous national and international engineering competitions in which the school is consistently successful; a vibrant entrepreneurial ecosystem; and extensive internship opportunities.

We offer students the chance to engage in cutting-edge research, whether in the many labs run by prominent faculty members in state-of-the-art facilities, or with potential employers in nearby federal research labs and corporations. Research enables students to dig deeper into their majors or explore new areas of possible interest.

With one of the nation’s most active chapters of Engineers Without Borders, Clark School students can apply their skills and energies in the service of less fortunate people all around the world. Service options closer to home are available through the many student societies, alternative spring breaks and targeted initiatives started by fellow students.

It is this range of opportunities that makes the Clark School so valuable to talented, ambitious students who want a deeper university experience. We encourage you to explore further by visiting www.eng.umd.edu.

Admission Requirements

Freshmen Admission

Direct Admissions Requirements

Admission to the A. James Clark School of Engineering is limited. Freshmen applicants are reviewed and will be admitted directly on a competitive basis. Evaluation is based on high school grades, standardized test scores, activities, leadership and demonstrations of potential to succeed. An applicant may apply to any of the majors offered within the School. An applicant also has the option of entering as an Undecided Engineering major and will typically choose a degree program in the first year.

Directly admitted freshmen will be subject to an academic review at the end of the semester in which they attain 45 University of Maryland credits. In order to successfully complete the review, students must have an overall GPA of at least 2.0 and have completed ENES100, Fundamental Studies English, and the following sequence of Gateway requirements: MATH141, PHYS161, and either CHEM135 or CHEM271 with a minimum grade of "C-" (Students who take CHEM134 must also have completed CHEM131 with a minimum grade of "C-".). Only one repeat of a single Gateway course, either at the University of Maryland or at any other university or college, will be considered to meet the review requirements. A course in which a grade of "W" (withdrawn) is earned is counted as an attempt. Students who fail to meet these requirements by the semester in which they attain 45 University of Maryland credits may be dismissed from the Clark School and may not reapply. Dismissed students may appeal in writing directly to the Associate Dean for Undergraduate Affairs in the Clark School.

Transfer Admission

Direct Admissions Requirements

Internal and external transfer students will be directly admitted to the Clark School if they meet the following Gateway requirements: MATH141 with a "B-" or higher, PHYS161 with a "B-" or higher, either CHEM135 or CHEM271 or CHEM134 with a minimum grade of "C-" or higher (Students who take CHEM134 must also have completed CHEM131 with a minimum grade of "C-".). Students must also have a minimum cumulative GPA of 3.0 in all college-level coursework, and have not previously been admitted to the Clark School of Engineering. Only one repeat of a single Gateway course, either at the University of Maryland or at any other university or college, will be considered to meet the review requirements. A course in which a grade of "W" (withdrawn) is earned is counted as an attempt. Students should wait until all gateway requirements are complete before applying for admission to the School.

TRANSFER ADMISSION Appeal Process

All students denied admission to the Clark School may appeal the decision in writing directly to the Associate Dean of Undergraduate Affairs in the Clark School.

Maryland Community College Transfer Students

Students who complete an associate’s at a Maryland community college may be prepared to enter into the sophomore or junior year in engineering at the University of Maryland if they have completed the required engineering coursework. To ensure that you are enrolling in the correct courses to transfer, please consult the Engineering four-year plans and the Transfer Credit Services website. There may be some courses which are not offered at Maryland community colleges. Students should investigate the feasibility of completing these courses during the summer session at the University of Maryland before starting their junior course work in the fall semester. A maximum of one-half of the degree credits (approximately 60 semester hours) may be transferred from a two-year community college program.

Departments

Departments and Units

No results were found.

Academic Programs

Majors

No results were found.

Minors

No results were found.
**Certificate**

No results were found.

**College Requirements**

**Undergraduate Degree Requirements**

Structure of Engineering Curricula: Courses in the curriculum or program and the prescribed credit hours leading to the degree of Bachelor of Science are outlined in the sections describing each department in the Clark School of Engineering. The courses in each curriculum may be classified in the following categories:

1. Courses in the General Education Program;
2. Courses in mathematics, chemistry, and physics;
3. Related technical courses, engineering sciences and other courses approved for one curriculum but offered by another department;
4. Courses in the major department. The courses in each engineering curriculum, as classified below, form a sequential and developmental pattern in subject matter. In this respect, curricula in engineering may differ from curricula in other colleges. Some regulations which are generally applicable to all students may need clarification for purposes of orderly administration among engineering students (see Academic Regulations [https://academiccatalog.umd.edu/undergraduate/registration-academic-requirements-regulations/academic-records-regulations]). Moreover, the Clark School of Engineering establishes policies that supplement university regulations.

**School Regulations**

1. The responsibility for proper registration and for satisfying stated prerequisites for any course must rest with the student as does the responsibility for proper achievement in courses in which the student is enrolled. Each student should be familiar with the provisions of this catalog, including the Academic Regulations.
2. Required courses in mathematics, physics, and chemistry have highest priority. It is strongly recommended that every engineering student register for mathematics or chemistry or mathematics and physics each semester until the student has fully satisfied requirements of the Clark School of Engineering in these subjects.
3. To be eligible for a bachelor’s degree in the Clark School of Engineering, a student must have an overall cumulative grade point average of at least a 2.0, and a grade of “C” or better in all engineering degree requirements (including all technical coursework but not limited to courses taken in MATH, PHYS, CHEM). Students matriculating to UMD in the fall of 2012 or after must also have a 2.0 cumulative GPA in their major courses, minor courses and classes used to satisfy certificate programs.
4. A course taken at UMD in which a grade has been earned may not be repeated via transfer from another institution.
5. Students in the Clark School of Engineering must have a minimum 2.0 University of Maryland GPA to enroll in courses at another institution.
6. All students are required to complete a number of general education courses and must follow the university’s requirements regarding completion of the General Education Program. Consult the Academic Regulations section of this catalog for additional information. Engineering students are required to complete Technical Writing, (ENGL393) for the Professional Writing requirement.

7. All degree programs in the Clark School of Engineering require a minimum of 120 credits plus satisfaction of all department, School, and University general education program requirements (Aerospace Engineering majors are required to complete a minimum of 124 credits). Students should be aware that for all currently existing engineering programs the total number of credits necessary for the degree exceeds 120 by some number that depends on the specific major.

Curricula for the various engineering departments are given in this catalog to illustrate how the programs may be completed in four years. These curricula are rigorous and relatively difficult. It is not uncommon for a student to extend their curriculum; this may be necessary or desirable for a variety of reasons. However, students should seek academic advising in order to ensure that courses are taken in the proper sequence.

Another factor impacting the academic plan is the math placement exam. For entering freshmen, the math placement is determined solely by performance on the University math placement exam and not on the Math SAT score. Placement in MATH115 or lower will delay eligibility to take certain engineering courses by a semester.

All students are encouraged to utilize the university’s degree auditing system, uAchieve, and to review the audit with their departmental advisor at least two semesters prior to graduation. The purpose of the audit is to discuss academic progress and confirm that graduation requirements are being completed.

**Departments and Degrees**

The Clark School of Engineering consists of eight academic departments and offers the degree of Bachelor of Science in the following fields of study: Aerospace Engineering, Bioengineering, Chemical Engineering, Civil Engineering, Computer Engineering, Electrical Engineering, Fire Protection Engineering, Materials Science and Engineering, and Mechanical Engineering. All of the above programs are accredited by the Engineering Accreditation Commission of ABET, [www.abet.org](http://www.abet.org).

Entering freshmen may enroll in the Clark School as Undecided Engineering. Students declared as Undecided Engineering are advised by the Office of Undergraduate Advising & Academic Support. No later than the second semester of the sophomore year, a student should select an academic degree program (Aerospace, Bioengineering, Chemical, Civil, Computer, Electrical, Fire Protection, Mechanical, or Materials Science and Engineering) and this department assumes the responsibility for the student’s academic guidance, counseling, and program planning from that point until the completion of the degree requirements of that program as well as the School. For the specific requirements, see the curriculum listing in each engineering department.

**Freshmen-Sophomore Years**

The freshmen and sophomore years in engineering are designed to lay a strong foundation in mathematics, physical sciences, and the engineering sciences upon which the student will later develop a professional program during the upper division (junior and senior) years. During the first two years, students are introduced to the concepts of engineering design and work in multidisciplinary teams. The Clark School course requirements for the freshmen and sophomore years are similar for all students, regardless of their intended academic program, thus affording the student maximum flexibility in choosing a specific engineering specialization.
Engineering Sciences

Engineering Science courses represent a common core of basic material offered to students of several different departments. All freshmen and sophomore students of engineering are required to take ENES100. Other ENES courses, ENES102, ENES220, ENES221, and ENES232 are specified by the different departments. The responsibility for teaching the engineering science courses is shared among faculty from different departments by means of the Keystone Program. In addition to the core courses noted above, several courses of general interest to engineering or non-engineering students have been given ENES designations.

No later than the sophomore year, a student should select an academic degree program (Aerospace, Bioengineering, Chemical, Civil, Computer, Electrical, Fire Protection, Mechanical, or Materials Science and Engineering) and this department assumes the responsibility for the student's academic guidance, counseling, and program planning from that point until the completion of the degree requirements of that program as well as the School. For the specific requirements, see the curriculum listing in each engineering department.

Advising

Advising is mandatory prior to registration each semester for all students in the Clark School. Each engineering department has a representative who advises students in their respective discipline. Undecided engineering students are advised by the Undergraduate Advising & Academic Support Office until they have declared a major. Refer to the individual program for additional advising information. During orientation to the University, all students will receive advising from the Undergraduate Advising & Academic Support Office in collaboration with departmental advising representatives.

Opportunities

Living-Learning Programs

Flexus: The Dr. Marilyn Berman Pollans Women in Engineering Living & Learning Community

Women in Engineering Program (http://www.wie.umd.edu)
1131 Glenn L. Martin Hall
301-405-3931
Acting Director: Mary Bowden

Flexus: The Dr. Marilyn Berman Pollans Women in Engineering (WIE) Living & Learning Community is a two-year living and learning community with the goal of promoting diversity and inclusion in the field of engineering. In alignment with the mission of the Women in Engineering Program, Flexus aims to shift the culture of engineering to be more inclusive of underrepresented groups, including, but not limited to, women. Open to incoming first-year engineering students, Flexus is for students who are looking for community, academic support, and ways to develop as future engineers outside of technical courses. The Flexus community works close with the Virtus Community.

Virtus: A Living and Learning Community for Success in Engineering

Successful Engineering Education and Development Support Program
1131 Glenn L. Martin Hall
301-405-3931
Acting Director: Mary Bowden

The Virtus Living and Learning Program is a two-year living and learning community designed for male engineering students. The primary focus of Virtus is on promoting community and inclusivity within the Clark School and the field of engineering. Virtus seeks to emphasize the importance of diversity and inclusion in the field of engineering and empower students to shift the culture of engineering to be more inclusive of underrepresented groups in the field of engineering, including, but not limited to, women. Through the promotion of social, intellectual, and leadership development, Virtus seeks to provide the resources and structure for first- and second-year engineering students to be successful through graduation, positively impacting the retention and graduation of undergraduate students in the A. James Clark School of Engineering. To do so, Virtus provides Living and Learning experiences that promote community, critical reflection, and creation of change. The Virtus community works closely with Flexus: Dr. Marilyn Berman Pollans’ Women in Engineering Living and Learning Community.

College Park Scholars - Science, Technology, and Society
1125 Cumberland Hall
301-405-7219; https://scholars.umd.edu/programs/sts
Director: David Tomblin

Co-sponsored by the Clark School of Engineering, the Science, Technology and Society (STS) program is one of 12 living-learning programs offered by the College Park Scholars Program. This 2-year program for academically talented freshmen and sophomores welcomes all majors, who live together in Cambridge Hall. While building close relationships with program faculty, STS explores the influential social, ethical, and political relationships that drive research and innovation. The program delves into the challenges of living and innovating in a world where emerging science and technologies are becoming increasingly interconnected, pervasive, and powerful. The program’s primary goal is to give students career development and analytical skills that help connect science and technology to broader social needs. STS pursues this goal through individual research projects, collaborative problem solving activities, user-centered design projects, and service-learning.

STS students participate in a number of field trips to further their understanding of the program themes and objectives. Sites include the National Institute of Standards and Technology, NASA Goddard Spaceflight Center, United States Patent and Trademark Office and the National Building Museum. Students also have the opportunity to engage in service actives related to the program such as volunteering for Maryland Robotics Day, Women In Engineering’s annual DREAM Conference, Maryland Regional Science Bowl, the Science and Technology Festival, and BitCamp.

STS features three rewarding practicum opportunities:

1. Robotics service-learning program, students explore innovative ways of encouraging STEM education in Prince Georges County schools;
2. Infrastructure and Society, students work with professional engineers on a service-learning project that assesses the safety and viability of infrastructure;
3. Sustainability and Design: Work with real clients from local communities to design the implementation of sustainable technologies.

Specialized Academic Programs

Science, Technology and Society Certificate

1125 Cumberland Hall, 301-405-7219
https://sts.umd.edu/
Director, David Tomblin, dtomblin@umd.edu

The undergraduate University Certificate program in Science, Technology, and Society (STS) enables students to learn about the dynamic,
interactive and creative relationships among science, technology, and society. This 21-credit program helps structure a student's general education and elective requirements into a unifying theme. The end product of the program is a research project of the student's own choosing, which is developed under faculty mentorship. The STS University Certificate is especially helpful to students who are seeking jobs that require understanding policy decisions as they relate to scientific and engineering endeavors, those students hoping to seek a graduate degree that integrates science, technology, and policy, or students simply interested in developing a greater understanding of social issues related to science and technology.

STS is an interdisciplinary field that has been taught for more than 30 years at universities in the United States and Europe, notably in those with strong engineering and public policy programs. In recent years, STS University Certificate students have chosen to write their capstone term papers about timely topics, including the interactions among science, technology and society related to nanotechnology, fuel cell applications, physics research funding, climate change modeling, religious principles as a basis for climate action, integration of SONAR into underwater vehicles, nuclear power in developing countries, and interpersonal impacts of social networking.

Courses:

The STS program requires 9 credits of Lower Level (100-200) and 9 credits of Upper Level courses (300-400) and ENES440. Students must obtain prior approval of the director before enrolling in courses toward their individualized STS curriculum. Many of these credits may overlap with major and minor requirements. For guidance, see the website for a list of approved courses, and note that students may ask the director to approve a course not listed on the website.

Lower Level (100- and 200-level) Courses (9 credits):

Three courses that relate science to society, technology to society, or science to technology; one of the courses should be CPSS225

Upper Level (300- and 400-level) Courses (12 credits):

These courses have an interdisciplinary orientation that demonstrates inter-relationships between science and society, between technology and society, or between science and technology. Students choose three courses and the fourth course is ENES440.

Joining the Program and Program Requirements:

Students interested in STS should contact the director to obtain advice and approval prior to enrolling in courses that fulfill the program. Students record their progress with the STS program office as they complete requirements, participate in a semi-annual advising meeting, and write a brief evaluation upon completing the program. Students must earn a minimum grade of "C" in each course they wish to credit toward the STS University Certificate. A student's individual course of study may not exceed these maximums: 9 credits of courses applied to the student's major; 3 credits of Special or Selected Topics courses; 9 credits of courses taken outside UMCP; and 6 credits of courses with the AREC, ECON and GVPT prefixes. Once all requirements are met and the director affirms that the student has completed the program, the Registrar includes a notation of this University Certificate on the student's transcript.

College Honors Program

Students in the A. James Clark School of Engineering may participate in the University's Honors College, College Park Scholars, Quest, and/or departmental honors programs (see the individual department section for details).

Clark School Engineering Honors Program (https://eng.umd.edu/engineering-honors-program)

The Clark School offers an Engineering Honors Program that provides eligible students the opportunity to pursue an enriched program of studies that will broaden their perspectives and increase the depth of their knowledge. Engineering students meeting all of the following criteria are eligible to apply:

1. Upper fourth of engineering juniors and seniors;
2. Junior standing or 60 applicable credits;
3. Completion of at least one semester at UMD.

The requirements for completing the program are as follows:

1. An Honors Research Project which often can be used as a technical elective, a written report, and an oral presentation to a faculty panel of the EHP;
2. Successful completion of both Engineering Honors Seminars ENES480 and ENES481;
3. Maintenance of a GPA to remain in the upper third of the class.

For more information see http://www.eng.umd.edu/current/honors-program.

Student Societies and Professional Organizations

Professional Societies

Each of the engineering departments sponsors student chapters or student sections of a national engineering society. The student chapters sponsor a variety of activities including technical meetings, social gatherings, and School or University service projects. All students are strongly encouraged to join one or more of these chapters.

These organizations are: American Helicopter Society-Intl.; American Institute of Aeronautics and Astronautics; American Institute of Chemical Engineers; American Nuclear Society; American Society of Civil Engineers; American Society of Heating, Refrigeration, and Air Conditioning Engineering; American Society of Mechanical Engineers; ASM International; Black Engineers Society; BMES-UMD (Biomedical Engineering Society, UMD chapter); Engineers Without Borders; Institute of Electrical and Electronics Engineers; Material Advantage (American Ceramic Society, ASM International and TMS joint chapters); Materials Research Society; Mechanical Contracting Association (MCA); Society of Asian Engineers; Society of Automotive Engineers; Society of Fire Protection Engineers; Society of Hispanic Engineers; Society of Manufacturing Engineers; and Society of Women Engineers.

Honor Societies

The Clark School of Engineering and each of the engineering departments sponsor honors societies. Nominations or invitations for membership are usually extended to junior and senior students based on scholarship, service, and/or other selective criteria. Some of the honors organizations are branches of national societies; others are local groups: Tau Beta Pi (College Honorary); Alpha Eta Mu Beta (Biomedical Engineering ); Alpha
The Office of Undergraduate Recruitment and Outreach is responsible for outreach and new student recruitment activities in the A. James Clark School of Engineering. Services include undergraduate recruitment, meeting with prospective students, providing K-12 and community college outreach activities, and administering the Clark School’s scholarship program for new students.

The Center for Minorities in Science and Engineering
1131 Glenn L. Martin Hall, 301-405-3878
Director: Rosemary L. Parker
www.cmse.umd.edu

The Center is dedicated to increasing the enrollment and graduation rates of African American, Hispanic, and Native American students majoring in engineering. The Center provides a complete package of services designed to assist students from pre-college through completion of the PhD. Services include academic advising, tutorial assistance, scholarship information, the BRIDGE Program, the BRIDGE to the Doctorate Fellowship, outreach programs, job information and support of student organizations.

Women in Engineering Program
1131 Glenn L. Martin Hall, 301-405-3931
Acting Director: Mary Bowden
www.wie.umd.edu

The Women in Engineering (WIE) Program in the Clark School of Engineering at the University of Maryland is dedicated to promoting the role of women in the field of engineering. Our focus is on the recruitment of prospective women engineering students and the retention of current undergraduate and graduate women engineering students.

Services offered include research and teaching fellowships, information listserv, website, living and learning communities, first year peer mentoring program, workshops on careers, outreach programs, speakers, a student advisory board, and support of women engineering organizations.

Financial Assistance

The Clark School offers scholarships to talented undergraduate engineering students. Scholarship awards are competitive and are awarded based on merit, financial need, and a variety of other factors. Scholarship awards are available to both incoming and continuing students.

New freshmen are automatically considered for most Clark School scholarships and are not required to apply for funding. Current students and new transfer students must complete the online scholarship application by May 31st for best consideration. Visit the website www.ursp.umd.edu/scholarships/index.html for more information. The Office of Student Financial Aid (OFSA) administers all types of federal, state, and institutional financial assistance programs and, in cooperation with other University offices, participates in the awarding of scholarships to deserving students. For more information, visit: www.financialaid.umd.edu.

Within the Clark School, the Clark Scholarship Programs (https://eng.umd.edu/clark-scholarship-program) oversees three scholarship programs funded by the A. James & Alice B. Clark Foundation.
• The Clark Scholars Program
• The Clark Opportunity Transfer Scholars Program
• The Clark Legacy Scholarships, which include the William Barotti, Clark Enterprises, Richard Getsinger, and Benjamin T. Rome Scholarships.

A. James Clark Scholars Program

The A. James Clark Scholars Program is the A. James & Alice B. Clark Foundation's signature academic program, combining engineering, business, leadership and community service. The program supports up to 10 new state of Maryland freshmen each year.

Clark Opportunity Transfer Scholars Program

The Clark Opportunity Transfer Scholars Program offers a scholarship for four semesters of study and includes comprehensive academic, career, and research support. The program supports up to 20 new transfer students who previously attended state of Maryland community colleges each year.

Clark Legacy Scholarships

The A. James Clark Legacy Scholarship is awarded to entering freshmen based on both financial need and merit. The Clark Legacy Scholarship is a partial scholarship renewable for an additional year, provided the recipient is an undergraduate engineering student, maintains good academic standing, and makes progress toward an engineering degree.

Benjamin T. Rome Scholarship

The Benjamin T. Rome Scholarship is awarded to one entering freshman student each year based on merit. The Rome Scholarship covers all expenses (tuition and fees, room and board) plus a book allowance and a stipend. The award is renewable for up to three additional years provided the recipient is an undergraduate engineering student, maintains good academic standing, and makes progress toward an engineering degree.

William Barotti and Richard Getsinger Scholarships

The William Barotti Scholarship and the Richard Getsinger Scholarship honor two of Mr. Clark's longtime employees. Each year, the William Barotti and the Richard Getsinger Scholarships provide partial scholarship support for two entering freshmen engineering students based on merit. Awards will be renewable for up to three additional years, provided the recipient is an undergraduate engineering student, maintains good academic standing, and makes progress toward an engineering degree.

Undergraduate Research Programs

Undergraduate research programs allow qualified undergraduate students to work with research laboratory directors in departments, thus giving students a chance for a unique experience in research and engineering design. Projects in engineering allow undergraduate students to do independent study under the guidance of faculty members in an area of mutual interest. For more information, contact the department or research center you are interested in performing research.

Engineering Information Technologies (EIT)

2125 J.M. Patterson Building
301-405-3885

Assistant Dean, Strategic Operations and IT: Jim Zahniser
zahniser@umd.edu
www.eit.umd.edu

Keeping pace with the latest developments in the area of information technologies worldwide, the Clark School of Engineering provides a state-of-the-art computing environment that will be the standard for engineers in the years ahead. Faculty and students have access to computer workstations with a wide range of engineering software and technology enabled classrooms with the latest presentation capabilities. In addition, EIT provides access and support on the latest tools and services for online collaboration, presentation technologies, and infrastructure services.

EIT, Instructional Technologies

2125 J.M. Patterson Bldg, 301-405-4907; Fax: 301-314-9639
Director: Marty Ronning, 301-405-4899
www.dets.umd.edu

Instructional Technologies provides distance education technology and AV support service to the A. James Clark School of Engineering and the UMCP campus. We serve over 1000 students per year by providing graduate and undergraduate courses in engineering and other related fields. In addition, we also provide technical, services to the campus such as video conferencing, video capturing, satellite services and more.