Schedule Review

Undecided (EAS) and Industrial Engineers (IE): follow Shawn to 209 Norton
(Advisor: Margaret [Jo] Meachem)

Computer Science (CS) and Computer Engineers (CEN): follow Jared to 338A Davis (Advisor: Donna Grant)

Biomedical (BE) and Chemical Engineers (CE): follow Ryan B. to 230A Davis
(Advisor: Jane Sinclair)

Civil (CIE), Electrical (EE), and Environmental Engineers, (ENV) and Engineering Physics (EGP): follow Emma to 113A Davis (Advisor: Kerry Collins-Gross)

Aerospace (ASE) and Mechanical Engineers (ME): stay here in 101 Davis with Steven (7/20)/Janet (7/23 +7/27) (Advisor: Drexel Gidney)

It’s OK if you weren’t certain which group to proceed into today!
Information presented is consistent, with only minor details added at the end for added interest.
Your 1st semester schedule

Step 1: Start Here

Completing your Orientation Data Form is your first step.

It gives us detailed information about your academic background, interests, and concerns so we can assign you an academic advisor, plan your orientation program and answer any questions you include on your Orientation Data Form. You will also have the opportunity to take the pledge to Finish in 4. It is very important that you complete the data form entirely, especially the questions regarding any AP and/or college courses which you have completed or are currently enrolled, as this will assist your Academic Advisor with helping you to plan your semester schedule properly.
Your 1st semester schedule

- General Education/University Writing Requirement: 1-2 courses
- SEAS Requirement
- Science Requirement, if engineer or freshmen seminar if CS
- Math Requirement

Total Credits: 15-17
### General Education Requirements:

Handout was included in schedule packet and is also online

<table>
<thead>
<tr>
<th>Category</th>
<th>Requirement</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Writing Skills</td>
<td>ENG 101 &amp; 201, or ENG 201</td>
<td>3-6</td>
</tr>
<tr>
<td>Math Skills</td>
<td>SEAS majors satisfy with requirements</td>
<td></td>
</tr>
<tr>
<td>Foreign Language</td>
<td>Engineering majors exempt/CS majors must satisfy</td>
<td></td>
</tr>
<tr>
<td>Natural Science</td>
<td>Engineering majors satisfy with requirements/CS majors must satisfy with particular subjects</td>
<td></td>
</tr>
<tr>
<td>World Civilization</td>
<td>UGC 111-112</td>
<td>6</td>
</tr>
<tr>
<td>American Pluralism</td>
<td>UGC 211 or cognate</td>
<td>3</td>
</tr>
<tr>
<td>Social Science</td>
<td>1 (3 cr min) course from approved dept.</td>
<td>3</td>
</tr>
<tr>
<td>Arts</td>
<td>1 (3 cr min) course from approved dept.</td>
<td>3</td>
</tr>
<tr>
<td>Humanities</td>
<td>1 (3 cr min) course from approved dept. pending ENG placement</td>
<td>3</td>
</tr>
</tbody>
</table>

**Library Skills:** Required by end of first year of study at UB!

http://ublib.buffalo.edu/libraries/workbook/
University Writing Requirement

> SAT Read 400-570/ACT English 17-26
  » ENG 101 - Writing 1 (3 cr)
  » ENG 201 - Writing 2 (3 cr)

> SAT Read 580-720/ACT English 27-31
  » ENG 201 - Writing 2 (3 cr)

> SAT Read 730-800/ACT English 32+
  » Exempt from Writing requirement

AP English Lang & Comp 4 or 5 = ENG 101
EAS 140 - Engineering Principles: Fall Semester

- Project-based class that teaches how to “think like an engineer” on real world problems
  - Alternative energy theme
  - Engineering principles and analysis
  - Hands-on project
  - Interaction with engineering professionals
- Professional Development
  - Career Exploration
  - Academic Transition

We do not accept Project Lead the Way credit for this course requirement.
NOTE: First lecture class at 12 noon on Monday, August 31st meets in Lippes Concert Hall (aka Slee Hall), instead of your normally assigned classroom.

EAS 140 Labs as meet as normally scheduled
Engineering Spring Freshman Seminar (1 cr hr)  
“Engineering Impact on Society”

- Grand Challenges for Engineering: diverse areas where engineering can “make a difference”
- Guest experts discuss their engineering approaches
- Students select own personal engineering challenge project

<table>
<thead>
<tr>
<th>Make solar energy economical</th>
<th>Engineer better medicines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provide energy from fusion</td>
<td>Reverse-engineer the brain</td>
</tr>
<tr>
<td>Develop carbon sequestration methods</td>
<td>Prevent nuclear terror</td>
</tr>
<tr>
<td>Manage the nitrogen cycle</td>
<td>Secure cyberspace</td>
</tr>
<tr>
<td>Provide access to clean water</td>
<td>Enhance virtual reality</td>
</tr>
<tr>
<td>Restore and improve urban Infrastructure</td>
<td>Advance personalized learning</td>
</tr>
<tr>
<td>Advance Health Informatics</td>
<td>Engineer the tools of scientific discovery</td>
</tr>
</tbody>
</table>
Student Excellence Initiatives

• Weekly Small Group Sessions (voluntary)
  - Clarification of concepts
  - How to approach problems, exams
  - Interactive practice of problems

• Faculty Mentors
  - Develop connection with School of Engineering
  - Inform students of engineering profession
  - Help students with transition to college
1st Semester CSE Courses

> CSE 115 Intro to Computer Science for Majors 1 (4 cr)

Required for Computer Science and Computer Engineering majors

Provides the fundamentals of the field to computer science and computer engineering majors, introducing students to algorithm design and implementation in a modern, high-level programming language. Emphasizes problem solving by abstraction.

**Prerequisite:** No previous programming experience required. Students must have completed high school pre-calculus (algebra and trigonometry)

> CSE 111 Great Ideas in Computer Science (4 cr)

Students study algorithmic problem-solving techniques and the course has a mathematical and laboratory component. Topics include introduction to programming, software tools and more.

**Prerequisite:** No previous programming experience required. For students not mathematically prepared to start in CSE115.
Notes for Finish in 4 Students:

Students majoring in computer engineering (CEN), computer science (CS), or bioinformatics (BCS) must complete a freshman seminar like UBE 101 their first year (very few seminars will be offered in spring 2016).

**UBE 101: University Experience**
Weekly seminar that assists first-year students in making the transition to the university. Through a small, interactive classroom environment intended to engage students in learning, we provide resources, foster important relationships, and help students to understand their responsibilities and privileges within the university community. A faculty or staff member and an undergraduate peer mentor collaboratively teach the course. 1 credit hour, Pass/Fail.

Honors Scholars majoring in CEN, CS, or BCS may complete UE 102 The Honors College Colloquium instead of UBE 101.

Students majoring in any engineering discipline other than computer engineering must complete EAS 140. EAS 140 satisfies the first-term, freshman course requirement stipulated in the Finish in 4 pledge.
> **General University Requirements:**

SEAS Office of Undergraduate Education  
410 Bonner Hall  
645-2774  
ubengineer@buffalo.edu

> **CSE Program Specific Advisement:**

CSE Undergraduate Advisor  
Donna Grant  
338R Davis Hall  
645-4758  
dmgrant3@buffalo.edu

Director of Undergraduate Studies  
Dr. Atri Rudra  
319 Davis Hall  
atri@buffalo.edu
1st Semester Science

- CHE 100 Introduction to Chemistry (4 cr)
  For students lacking adequate preparation in chemistry

- CHE 105 Honors Chemistry I (5 cr)
  Introduces the principles of chemistry and their applications.
  For students who are interested in majoring in a chemistry-related science.

- CHE 107 General Chemistry I for Engineers (4 cr)
  *As indicated on the FAQ in your schedule packet:*

  CHE 107 General Chemistry I for Engineers has a lecture, recitation, and a lab. Attendance at all components is required. Although the room locations for the lab component are currently listed in your schedule as “Nsc Arr” (section ID ends with an “8”), a particular lab room will eventually be listed in your schedule. The CHE 107 recitation and lab components will not begin meeting until the week of September 7.

AP Chemistry 4 or 5 = elective credit unless complete CHE 114 lab at UB in spring 2016 or later with “C” grade or better.

This option is not recommended in majors like chemical engineering and biomedical engineering.
PHY 107 General Physics I (4 cr):

A calculus-based introductory course primarily for chemistry, engineering, and physics majors. Covers kinematics, Newton's laws, energy, momentum, rotational motion, and oscillations.

Normally taken in spring term, unless majoring in engineering physics.

Engineering physics majors often take PHY 107 in the fall semester along with CHE 107, EAS 140, MTH 141, and one gen ed.

Computer Science majors are the only SEAS students with option to complete non-calc based PHY 101-102/151-152 sequence as science requirement, and often wait to do begin science requirement until sophomore year.

“AP Physics 1 or 2” with 3, 4 or 5 = non-calc based courses that do not apply toward engineering majors, only computer science major, general education.

AP Physics C Mechanics 4 or 5 = PHY 107
AP Physics C Elec & Magnetism 4 or 5 = PHY 108 & PHY 158
1st Semester Mathematics

> ULC 148 Intermediate Algebra and Trigonometry (4 cr)
  For students lacking adequate preparation for calculus
> MTH 141 Calculus I (4 cr)
> MTH 142 Calculus II (4 cr)
  For students with transfer or AP credit for Calculus I
> MTH 241 Calculus III or MTH 306 Diff Equations (4 cr)
  For students with credit for Calculus I and II

AP Calculus AB 4 or 5 = MTH 141
AB subscore on BC exam 4 or 5 = MTH 141
AP Calculus BC 4 or 5 = MTH 142

Web-based Are You Ready quiz/reviews at: http://www.math.buffalo.edu/rur_index.html
**Example 1st semester schedule**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENG 101 Writing 1</td>
<td>3</td>
</tr>
<tr>
<td>UGC 111 World Civilizations 1</td>
<td>3</td>
</tr>
<tr>
<td>EAS 140 Engineering Principles, CSE 115 Intro to CS or CSE 111 Great Ideas in Computer Science</td>
<td>3-4</td>
</tr>
<tr>
<td>MTH 141 College Calculus I</td>
<td>4</td>
</tr>
<tr>
<td>CHE 107 General Chemistry for Engineers (not CS majors)</td>
<td>4</td>
</tr>
<tr>
<td>UBE 101 University Experience (Fi4 CS students)</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total Credits:</strong> 15-17</td>
<td></td>
</tr>
</tbody>
</table>

- 12 credits (minimum) are necessary to be a full-time student; full-time students are billed a full-time rate, not a per-credit rate, so tuition charges do not accrue for additional credits beyond 12.
- 15 credits (minimum) are necessary to be eligible for dean’s list: [http://undergrad-catalog.buffalo.edu/policies/grading/deanslist.shtml](http://undergrad-catalog.buffalo.edu/policies/grading/deanslist.shtml)
- 17 credits (minimum) are typically necessary to graduate in 4 years with an engineering major; 15 with a CS major.
- 19 credits is the maximum permitted per semester without special permission; first semester non-honors engineering students are not granted special permission.
FAQ: What if I want to change my schedule? Do I have to talk to an advisor?

Each class in your schedule was recommended by your academic advisor to fulfill a specific requirement in your major and/or the university (based on on your math/science/English placements and the data you provided on the orientation data form).

In most cases the same exact schedule was also given to several other students so that it will be easier for you to meet and study with other SEAS students.

Changes to your schedule are possible, but will mean that this continuity will not be as effective for you. Although you can attempt to make schedule changes on your own, we strongly recommend that you get assistance with changes.

There may be issues regarding prerequisites, limited course offerings (sometimes courses look open when they aren’t), etc. that an advisor should give you input on. Since some course changes are more complex than others we prefer that you submit your request through our online form so that we can help determine the best way to proceed:

http://www.eng.buffalo.edu/freshman-schedule

NO LATER THAN FRIDAY, AUGUST 7!
FAQ: I want to change my major. How do I do this and do I have to change my schedule?

If you are changing between two engineering majors and neither of these is computer engineering or engineering physics, you will not need to change your first-semester schedule.

However, if you are switching to or from Computer Science, Computer Engineering, or Engineering Physics, your requirements may change and you should contact an advisor.

Use the comment section of our form to request a change in your major: http://www.eng.buffalo.edu/freshman-schedule
UB’s Discovery Seminar Program offers a small class experience for first- and second-year students, providing them with the opportunity to engage with a distinguished faculty member around a thought-provoking and challenging topic.

View course offerings at http://academies.buffalo.edu/discoveryseminars/seminars.php/
Important Dates for Fall 2015

> Classes Begin: Monday, August 31

> Last Day to Add/Drop: Tuesday, September 8, 11:59 pm EST
  (changes will not appear on transcript; no financial liability)

> Last Day to Resign: Friday, November 13, 11:59 pm EST
  (Grade of “R” permanently on transcript; affects attempted credits/financial aid; full financial liability; several academic implications)

> Last Day of Classes: Friday, December 11

> Final Exams: Monday, Dec. 14 – Monday, Dec. 21
Student Clubs and Societies

- American Institute of Aeronautics & Astronautics (AIAA)
- American Institute of Chemical Engineers (AICHe)
- American Society of Civil Engineers (ASCE)
- American Society of Mechanical Engineers (ASME)
- Association of Computing Machinery (ACM)
- Biomedical Engineering Society (BES)
- Engineers for a Sustainable World (ESW)
- Institute of Electrical and Electronic Engineers (IEEE)
- Institute of Industrial Engineers (IIE)
- National Society of Black Engineers (NSBE)
- Society of Automotive Engineers (SAE)
- Society of Hispanic Professional Engineers (SHPE)
- Society of Women Engineers (SWE)
- Students for the Exploration and Development of Space (SEDS)
- Theta Tau (professional co-ed engineering fraternity)
- Tau Beta Pi + several engineering honor societies!
- UB Robotics
- Design Club
- Scientista
Join the club or organization!

- SAE Clean Snowmobile & Mini Baja Vehicle
- ASCE Concrete Canoe Team & Steel Bridge Team
- UB Robotics' Unmanned Vehicle Team
- AIChE Chem-E-Car
- AIAA Design-build-fly
- IEEE Micro Mouse
- Mars Rover

And More!

- 3rd: 2015 RASC-AL Robo-Ops Competition
- 4th: 2015 National Steel Bridge Competition
Exchange ideas, gain confidence, and network with female peers and colleagues

PROGRAM COMPONENTS

> Coordinated Study Groups
> Guest Lectures
> Brown Bag Lunch Series
> Discovery Seminar: Women in Science and Engineering

https://buffalo.collegiatelink.net/organization/wise
All orientation presentations will be online via Advisement/New Freshman Info

Use the new student checklist to make sure you are doing all that you need to before classes start:

http://orientation.buffalo.edu/checklist.php

HAVE A GREAT SUMMER! SEE YOU IN AUGUST!
Mechanical engineers are involved in research and development, design, manufacturing, and technical sales of the widest variety of products. Specific areas of involvement include computer-aided design and manufacturing; robotics; power plants; engines; materials; automotive vehicles and systems of transportation; industrial equipment; control and measurement devices; instrumentation; biomedical devices; apparatus for the control of air, water, noise, refuse, and other types of pollution; underwater technology; space flight equipment; and safety devices and sensors. As you can see from this list - mechanical engineering covers a wide range of applications and is, in fact, one of the broadest of the engineering disciplines.
Here at the University at Buffalo, our four-year undergraduate program leading to the B.S. degree in aerospace engineering is designed to prepare students to assume leadership positions in the aerospace industry and related industries. This includes the traditional aeronautics and astronautics applications (subsonic and supersonic aircraft, satellites, space shuttle, space station, etc.) as well as aerospace-related component development (design of structures, devices and instruments) and vehicle and propulsion system design. A variety of industries appreciate and seek the talents of aerospace engineers. The automotive industry, for example, has recently seen increased interest in aerospace technologies such as aerodynamics, feedback control, propulsion, system dynamics, and lightweight structures. The aerospace engineering program is also intended to prepare students for service in aerospace-related government agencies, such as NASA; FAA; and the U.S. Air Force, Navy, or Marine flying services. While many students enter industry directly after completing the B.S. program, a significant number elect to pursue graduate work in engineering or other fields.

<table>
<thead>
<tr>
<th>Freshman</th>
<th>Sophomore</th>
<th>Junior</th>
<th>Senior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>Spring</td>
<td>Fall</td>
<td>Spring</td>
</tr>
<tr>
<td>MTH141</td>
<td>MTH142</td>
<td>MTH241</td>
<td>MTH306</td>
</tr>
<tr>
<td>College Calculus I</td>
<td>College Calculus II</td>
<td>Intro to Differential Equations</td>
<td>\</td>
</tr>
<tr>
<td>CHE107</td>
<td>MAE177</td>
<td>PHY108</td>
<td>EE200</td>
</tr>
<tr>
<td>Chemistry I</td>
<td>Engineering Drawing and CAD</td>
<td>General Physics II</td>
<td>Electrical Eng Concepts Nonmajors</td>
</tr>
<tr>
<td>EAS140</td>
<td>PHY107</td>
<td>PHY158</td>
<td>EAS208</td>
</tr>
<tr>
<td>Engineering Principles</td>
<td>General Physics I</td>
<td>General Physics II Lab</td>
<td>Dynamics</td>
</tr>
<tr>
<td>Gen Ed</td>
<td>EAS230</td>
<td>EAS207</td>
<td>EAS209</td>
</tr>
<tr>
<td>Engineering Computation</td>
<td>Statics</td>
<td>Mechanics of Solids</td>
<td>Applied Math for MAE</td>
</tr>
<tr>
<td>Gen Ed</td>
<td>EAS202</td>
<td>MAE204</td>
<td>Gen Ed</td>
</tr>
<tr>
<td>Engineering Impact on Society</td>
<td>Thermodynamics I</td>
<td>\</td>
<td>\</td>
</tr>
<tr>
<td>Gen Ed</td>
<td>EAS278</td>
<td>MAE287</td>
<td>Gen Ed</td>
</tr>
<tr>
<td>Intro to Aerospace Engineering</td>
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</tbody>
</table>

17 HOURS 17 HOURS 18 HOURS 16 HOURS 15 HOURS 16 HOURS 17 HOURS 18 HOURS
Double Majors
A double major is the awarding of one degree with two majors (e.g., the student completing a double major in mechanical engineering and aerospace engineering earns one B.S. degree). Students must be accepted into each major and fulfill all requirements of each major in addition to satisfying all university requirements. This may be completed within the usual 120-credit minimum. Following conferral of the degree, the student’s transcript will note one baccalaureate degree and two majors.

Requires all of the ASE requirements + these ME requirements:

- MAE 311 Machines I (3 credits)
- MAE 364 Manufacturing Process (3 credits)
- MAE 494 Design Project (3 credits)
- One Professional Practice course (3 credits)

4 ½ years due to requisite sequence and fall/spring course offerings

Finish in 4 does not offer financial support for extra terms required for completing programs like this

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http://www.eng.buffalo.edu/undergrad/academics/degree-combinations
The University at Buffalo School of Engineering & Applied Sciences and the School of Management offer a five-year program leading to a combined Bachelor’s degree/Master’s degree in Business Administration. This program reduces the typical path of a four year bachelor’s degree and a two year MBA by one year. This is possible because of a slight reduction in undergraduate courses created by overlapping electives and the substitution of equivalent graduate-level courses. When completed, students’ records will indicate two degrees individually awarded as part of a combined degree program.

Students interested in one of these programs must first be accepted into the School of Engineering and Applied Sciences as an approved major. The outlines provided below for each major follow very closely the typical sequence recommended for the standard bachelor’s degree for the first three years. Students should take the GMAT/GRE and apply to the MBA program early during their junior year (third year course requirements). Students must formally apply to the MBA program by submitting the online application by May 1 (March 1 if you are a US citizen or permanent resident and want to be considered for financial aid in the form of a fellowship, scholarship, or graduate assistantship). Admissions will be limited to students who can satisfy the entrance requirements for the MBA program.

If accepted into the combined degree program, students begin standard MBA classes in the fall semester of what is typically their senior year of engineering. Throughout that senior year and the next additional year students complete the MBA curriculum and their few remaining undergraduate requirements.

Five-year outlines for all of our combined degree programs in the School of Engineering & Applied Sciences with helpful advisement footnotes are provided online for student reference. 

> Chemical Engineering
> Civil Engineering
> Electrical Engineering
> Industrial and Systems Engineering
> Mechanical Engineering
> Computer Science

You would not be eligible to continue in Finish in 4 if you ended up enrolling/getting accepted in one of these combined degree programs.
“Industrial engineers determine the most effective ways to use the basic factors of production—people, machines, materials, information, and energy—to make a product or provide a service. They are concerned primarily with increasing productivity through the management of people, methods of business organization, and technology. To maximize efficiency, industrial engineers study product requirements carefully and then design manufacturing and information systems to meet those requirements with the help of mathematical methods and models. They develop management control systems to aid in financial planning and cost analysis, and they design production planning and control systems to coordinate activities and ensure product quality. They also design or improve systems for the physical distribution of goods and services and determine the most efficient plant locations. Industrial engineers develop wage and salary administration systems and job evaluation programs. Many industrial engineers move into management positions because the work is closely related to the work of managers…” Occupational Outlook Handbook, 2010, www.bls.gov
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If your major is listed in the HUB as "EAS012R0A: Engnrng In Pgm No Maj BS" you are accepted into UB Engineering as an undecided engineering major, and we know that you are exploring your options before declaring a particular engineering major.

Since you need to select a specific discipline in order to graduate, you will need to work very closely with an engineering advisor in 410 Bonner to select appropriate courses, and also put some personal effort into researching the various fields you might be interested in. You can seek assistance with this from Career Services as well as engineering professors in each department. The EAS 140 class will help with this too. In order to graduate in four years, you will need to make a timely decision. You'll want to narrow in on a specific major by the end of your freshman year.

As an EAS student exploring majors, your Finish in 4 Plan will be determined on a term by term basis. You will need to complete approximately 17 credits of the right course requirements per semester, and depending on your choices, you might need to include additional summer coursework to stay on track. The electronic plans found on our website will help identify the course requirements for all engineering majors and also help identify the important course requisite information that you'll need to be mindful of (pre/co/post course requisites).
Here are some helpful generalities that your advisor will use to guide you in your planning:

All engineering majors require:

• EAS 140 and EAS 202 (except for computer engineers, who take CSE 115 and CSE 116 as their freshman sequence, along with UBE 101 in the first semester if participating in Finish in 4). Please note, if you are seriously considering majoring in Computer Engineering it might be in your best interest to take CSE 115 in your first fall semester instead of EAS 140. Ask an advisor.

• MTH 141, 142, 241, and 306. Usually recommended in this order, with the exception of electrical and computer engineers who take MTH 306 prior to MTH 241 because of EE 202 corequisite (MTH 306 should be taken at least at the same time as EE 278).

• PHY 107, 108, and 158 (except for environmental engineers who don't need PHY 108/158)

• CHE 107 (CHE 101 is an approved equivalent)

• EAS 230 (except for computer engineers)

Students who want to leave their options completely open are advised to take CHE 108 following CHE 107 unless they have ruled out serious interest in biomedical, chemical, civil, and environmental engineering, and engineering physics. CHE 108 can fulfill a requirement for all majors except for computer engineering and aerospace engineering.

BIO 201 (Cell Bio; Sp/Su) will satisfy the science elective for industrial engineering (instead of CHE 108 or PHY 207/257); is required in chemical engineering; is a technical elective in environmental engineering; can satisfy the BE 202 requirement in biomedical engineering if you are designated as a premed student; or can satisfy one course in the Science and Engineering track in Mechanical Engineering.
Chemical engineering concerns the design, scale-up, and operation of chemical processes, and the understanding and design of technologically useful materials. Chemical engineers are responsible for the economical, safe, and environmentally benign production of useful quantities of vital materials—from grams of a new drug to tons of a commodity chemical. Chemical engineers use these same skills to understand and manipulate natural processes, such as in biological systems.

The undergraduate major in chemical engineering at UB is broadly based to prepare graduates for positions in engineering development, design, economic evaluation, sales, construction, production, and management. A number of our undergraduates go on for graduate study and careers in research, and some pursue degrees in medicine, business, or law.
Combined Bachelors/MBA Degree Programs

The University at Buffalo School of Engineering & Applied Sciences and the School of Management offer a five-year program leading to a combined Bachelor’s degree/Master’s degree in Business Administration. This program reduces the typical path of a four year bachelor's degree and a two year MBA by one year. This is possible because of a slight reduction in undergraduate courses created by overlapping electives and the substitution of equivalent graduate-level courses. When completed, students’ records will indicate two degrees individually awarded as part of a combined degree program.

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Biomedical engineers combine the problem solving ability of engineers with the knowledge of the biological and medical fields to develop new solutions for improving human health, healthcare, and quality of life for all people. Biomedical engineers work in research and development, product design, manufacturing, operations, service, technical sales and marketing, consulting, education, and environmental problem solving.

The undergraduate program provides the scope of knowledge and training for employment in the field and also forms the basis for further study at the graduate level. The curriculum emphasizes four main areas (Imaging, Tissue Engineering, Sensor Materials and Devices, and Computation), and allows for students to obtain depth in areas of their choice through technical electives. The program is designed to serve you whether you plan to enter industry directly after earning your degree or if you plan to continue their education through formal graduate study, including medical school.
Computer Engineering is the design and prototyping of computing devices and systems. While sharing much history and many areas of interest with Computer Science, Computer Engineering concentrates its effort on the ways in which computing ideas are mapped into working physical systems. Emerging equally from the disciplines of Computer Science and Electrical Engineering, Computer Engineering rests on the intellectual foundations of these disciplines, the basic physical sciences and mathematics.

The main branches of Computer Engineering are the following:

- Networks
- Multimedia computing
- VLSI systems
- Reliable computing and advanced architectures
- Other important topics in Computer Engineering include Display Engineering, Image and Speech Processing, Pattern Recognition, Robotics, Sensors and Computer Perception.
Computer Science BS - Students entering CS Fall 2011 or Later

Computer Science is the systematic study of algorithmic methods for representing and transforming information, including their theory, design, implementation, application, and efficiency. The discipline emerged in the 1950s from the development of computability theory and the invention of the stored-program electronic computer. The roots of computer science extend deeply into mathematics and engineering. Mathematics imparts analysis to the field; engineering imparts design. The main branches of Computer Science are the following:

> Algorithms
> Theory of Computation
> Computer Architecture
> Software Systems
> Artificial Intelligence
> Other important topics in Computer Science include Computer Graphics, Databases, Networks and Protocols, Numerical Methods, Operating Systems, Parallel Computing, Simulation and Modeling, and Software Engineering.
Many students ask about the difference between the two Computer Science programs. A simple answer is that the B.A. in Computer Science is an undergraduate degree offering breadth, while the B.S. in Computer Science is an undergraduate degree offering depth. Students often ask which degree is “superior” or which is better for the job market. The answer to this question depends, of course, on what you intend to do after graduation. If you intend to go on to graduate school, both degrees are equally good.
Computer Science BA vs. BS ?!

If you intend to enter the job market immediately after graduation, which degree is "better" depends on the particular job you are applying for.

Representatives from a major computer company have told us that, all factors being equal, if you have no relevant Computer Science work experience, then the more Computer Science courses you have, the better your chance of employment in an entry-level position.

Of course, it is possible for a B.A. major to take as many Computer Science courses as a B.S. major, as well as having the external concentration!

However, they also told us that after three years, the work experience becomes more important than which degree you have.

They also agreed that an appropriate external concentration for a B.A. might well tip the scales in your favor.

The bottom-line recommendation they had was this: In your cover letter for a job, simply say that you have a bachelor's degree in Computer Science, and then spell out what your undergraduate program consisted of (e.g., for someone looking for a job in computer graphics: "I took courses in <list your CSE courses, presumably including CSE 480, Computer Graphics!>, as well as an external concentration in art, which allowed me to apply my artistic background to my work in graphics."); after all, your transcript will indicate which degree you have. Of course, it is preferable to earn a B.A. with good grades than a B.S. with lower grades.
The University at Buffalo School of Engineering & Applied Sciences and the School of Management offer a five-year program leading to a combined Bachelor’s degree/Master’s degree in Business Administration. This program reduces the typical path of a four year bachelor's degree and a two year MBA by one year. This is possible because of a slight reduction in undergraduate courses created by overlapping electives and the substitution of equivalent graduate-level courses. When completed, students’ records will indicate two degrees individually awarded as part of a combined degree program.

Students interested in one of these programs must first be accepted into the School of Engineering and Applied Sciences as an approved major. The outlines provided below for each major follow very closely the typical sequence recommended for the standard bachelor's degree for the first three years. Students should take the GMAT/GRE and apply to the MBA program early during their junior year (third year course requirements). Students must formally apply to the MBA program by submitting the online application by May 1 (March 1 if you are a US citizen or permanent resident and want to be considered for financial aid in the form of a fellowship, scholarship, or graduate assistantship). Admissions will be limited to students who can satisfy the entrance requirements for the MBA program.

If accepted into the combined degree program, students begin standard MBA classes in the fall semester of what is typically their senior year of engineering. Throughout that senior year and the next additional year students complete the MBA curriculum and their few remaining undergraduate requirements.

Five-year outlines for all of our combined degree programs in the School of Engineering & Applied Sciences with helpful advisement footnotes are provided online for student reference.

- Chemical Engineering
- Civil Engineering
- Electrical Engineering
- Industrial and Systems Engineering
- Mechanical Engineering
- Computer Science

You would not be eligible to continue in Finish in 4 if you ended up enrolling/getting accepted in one of these combined degree programs.
The Bioinformatics and Computational Biology (BCB) program is an interdisciplinary program that involves the application of mathematics and computing to the study of genes and proteins; computational biology addresses more general questions involving computing applied to cellular and sub-cellular structures. As such, students in bioinformatics and computational biology integrate topics of applied mathematics, computer science, and biology into specialties as diverse as genetics, computational science, and microbiology.

The program prepares students for graduate studies either in a bioinformatics-related field or in a traditional discipline, as well as for immediate entry into the job market. All students take courses in calculus, statistics, molecular biology, organic chemistry, and databases, as well as a core course in bioinformatics. In addition, students complete a senior project during their senior year. The BCB is a single degree program. Students in the BCB program have the option to select a major from among three concentrations. The outline above is for the concentration in Computer Science, one of three concentrations available. The other two concentrations available are Biology and Mathematics.
Civil engineers build societies, from the landmarks that define who we are to the hidden infrastructure essential to our quality of life. Projects such as the Hoover Dam, the Tappen Zee Bridge, Boston's 'Big Dig,' the interstate highway system, and New York City's water supply system illustrate the diversity, scale, grandeur, and functionality that is civil engineering. Because they often work in the public arena, civil engineers require broad technical training as well as strong communication skills, and usually must be licensed as professional engineers.

UB’s civil engineering program provides you with an integrated education in mathematics, basic sciences, English composition, ethics, humanities, and fundamentals of civil engineering, engineering design, and computer simulations in engineering. A solid foundation is provided in four major discipline areas of civil engineering, with more in-depth specialization provided through a choice of senior-year electives.
Civil Engineering Specialization Tracks

Specialization Tracks

Civil engineering majors may pursue a general degree program or configure their electives to provide specialization in one of five sub-disciplines, as detailed in the subsequent sections.

- Construction Engineering and Management
- Environmental Engineering
- Geotechnical Engineering
- Structural Engineering
- Transportation Engineering
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> Civil Engineering
> Electrical Engineering
> Industrial and Systems Engineering
> Mechanical Engineering
> Computer Science

You would not be eligible to continue in Finish in 4 if you ended up enrolling/getting accepted in one of these combined degree programs.
Electrical engineers design, develop, test, and supervise the manufacture of electrical equipment. Some of this equipment includes electric motors; machinery controls, lighting, and wiring in buildings; radar and navigation systems; communications systems; and power generation, control, and transmission devices used by electric utilities. Electrical engineers also design the electrical systems of automobiles and aircraft.

Our curriculum is designed to prepare our graduates to immediately contribute to the workforce of the profession, and to be prepared to pursue advanced study and engage in continuous professional development. The first two years emphasize the physical sciences and mathematics. Additionally, fundamental classes in digital principles, circuits, and signals complete the second year. The third year consists of coordinated sequences in electronics and electronic circuits, communications and signal processing, microprocessors and microcomputers, and electromagnetic theory. Fourth-year courses are designed to reinforce lab skills, practice design, and broaden the students’ background knowledge through technical electives.
Specializations
By selecting technical electives, students can specialize in one of four areas:

- Solid State Electronics
- Optics and Photonics
- Signals, Communications, and Networking
- Energy Systems
Environmental engineers work at the interface of society and the environment, striving to protect both human and ecosystem health. Among the top priorities of the profession are the delivery of safe water to drink and clean air to breathe, and the restoration of water quality in the Great Lakes, the Hudson River and natural water systems throughout the nation. Today, environmental engineers face issues that are changing the world. With their unique combination of environmental science and engineering, environmental engineers are the linchpins in defending the global public health, water supplies and ecosystem viability.

The environmental engineering curriculum includes math and science courses in the freshman and sophomore years, required engineering courses in the junior and senior years, and technical elective courses in the senior year. Students may select technical electives from engineering and a wide range of supporting programs.
This program leads to a Bachelor of Science degree in engineering physics and is intended for those students whose interests center on the more fundamental aspects of electrical engineering and physics, but who also wish to have extensive contact with the applied aspects (instrumentation, circuit design) of those subjects. The program is designed such that a student can pursue a graduate program in electrical engineering or applied physics, depending on their interest.

This course of study provides students with a unique combination of the fundamental principles of modern electronics, as well as a thorough education in electrical measurements and instrumentation. This program should be considered only by students whose academic performance is very strong.