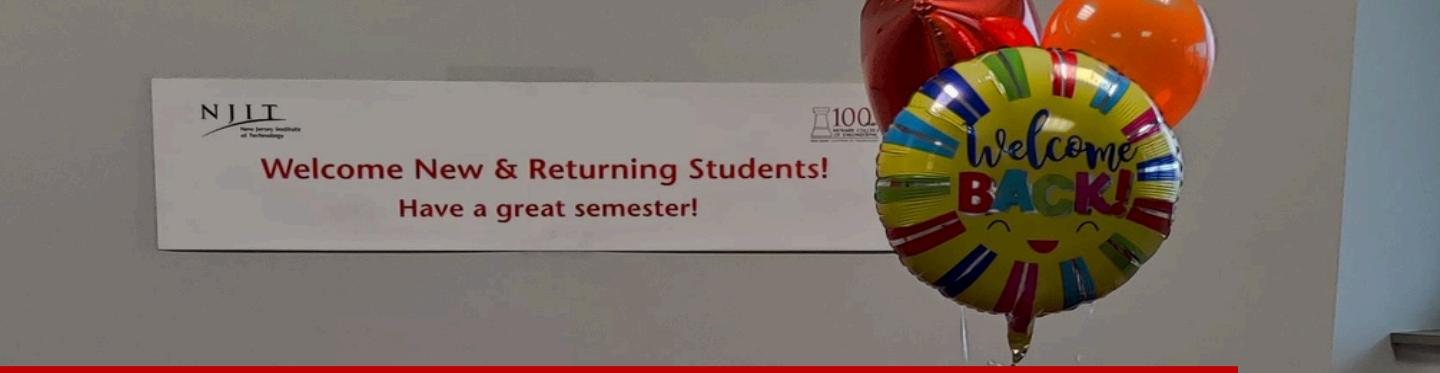
NJIT
New Jersey Institute of Technology

Department of Biomedical Engineering, New Jersey Institute of Technology

FRESHMAN ARRIVAL GUIDE

2024-2025



Dear Incoming Freshmen Biomedical Engineers,

Welcome to the Department of Biomedical Engineering at NJIT!

The BME Freshman Arrival Guide was first published for the Class of 2018, aiming to offer incoming students a comprehensive understanding of the BME Department at NJIT. Its primary goal is to serve as a valuable resource, presenting essential information on academics, registration, tutoring services, web services, faculty, and more. The guide incorporates messages from current students and features a FAQ section. We hope that this handbook becomes your go-to reference for any questions you may have during your first two semesters in the program.

This handbook was written by students, for students, under the guidance of the BME Undergraduate Program Director. As academic policies and procedures change, so must this handbook. If you are interested in updating this handbook for next year's freshmen, please contact your Senate representative.

We wish you a happy and successful first year!

Before You Begin

The transition from high school to college is one of the most significant transitions you will have to make in your lifetime. Many of you have a new home for the next four years and will learn to be self-sufficient. This drastic lifestyle change will coincide with a rigorous academic curriculum. From the first semester, you will be challenged and take courses that directly relate to your major. Biomedical Engineering is an extremely rewarding and fulfilling major but requires a lot of effort to succeed. The demanding curriculum can be made simpler with the inclusion of **AP Credits**. However, not all AP course credits will count toward the Biomedical Engineering curriculum. For applicable AP Credits to count toward the major, the scores must be sent to NJIT, where the appropriate departments will review them and confirm whether or not they are accepted. As a general rule, an AP score of 4 or higher will count as credit for most courses. Check here to view a full list of what will count and what will not here.

For students enrolled in the Pre-Health concentration: AP Biology credits will not count. College-level Biology courses must be taken. You must speak with the appropriate academic and Pre-Health advisors to arrange when that will be taken.

Similar to AP Credits, **Transfer Credits** can count for appropriate classes. You must check that these credits directly translate to the appropriate NJIT course before you take the course, to save time and money, by checking njtransfer.org. Also, you must obtain a permit from the appropriate department at NJIT, to ensure that the department will count the community college course for credit. It should be noted that Transfer Credits and AP Credits will NOT count towards your GPA at NJIT. However, it is still important to receive a passing grade (a C or higher) in the course in order for the course credit to transfer.

Concentration Descriptions

Designing a prosthetic leg requires knowledge of biomaterials, medical devices, and biomechanics.

Biomedical engineering encompasses the study of physiological and biological processes with engineering methods. You will have the opportunity to choose one of three concentrations at the end of your sophomore year. The concentrations available are Medical Device & Imaging, Biomechanics, and Biomaterials, each drawing upon specific engineering disciplines. These specializations often intersect and rely on one another. For example, in the design of a prosthetic leg, mechanical study aids in understanding structure and function, while materials engineers select appropriate materials for skin-device interaction. Electronic principles are needed in order to develop the control system. Collaboration between specialty areas enhances advancements and outcomes in biomedical engineering! Students can combine their concentration with additional coursework to meet Pre-Health requirements. Students can also complete coursework to prepare them for research during their academic career.

MEDICAL DEVICE & IMAGING

Medical Device & Imaging focuses on the application of electronics and measurement principles and techniques to develop devices used in diagnosis and treatment of disease. Computers are becoming increasingly important in bioinstrumentation, from the microprocessor used to do a variety of small tasks in a single purpose instrument to the extensive computing power needed to process the large amount of information in a medical imaging system.

Bioinstrumentation students rely on a strong foundation in differential equations and MATLAB.

BIOMECHANICS

Biomechanics is mechanics applied to biological systems and medical problems. It includes the studies of motion, material deformation, of fluid mechanics within the body and in medical devices, and transport of chemical compounds across biological and synthetic media and membranes. Efforts in biomechanics have developed the artificial heart and replacement heart valves, the artificial kidney, the artificial hip, as well as built a better understanding of the function of organs and the musculoskeletal system.

Biomechanics students rely on their skills in MATLAB, CAD software, and physics to succeed.

BIOMATERIALS

Biomaterials covers both living tissue and materials used for implantation. Understanding the properties of the living material is vital in the design of implant materials. The selection of an appropriate material to place in the human body may be one of the most difficult tasks faced by the biomedical engineer. Biomaterials students require a high level of competence with biology and chemistry.

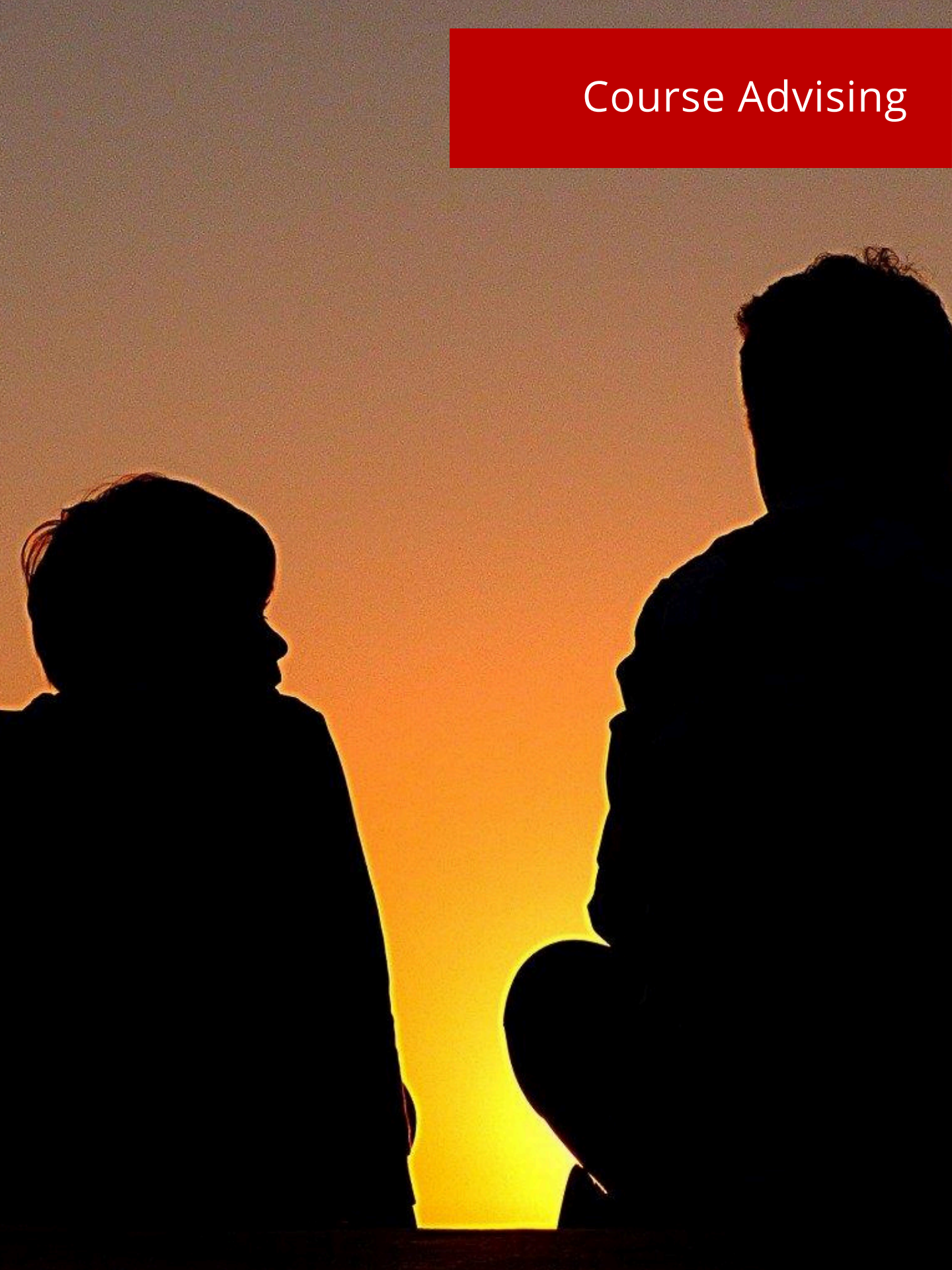
PRE-HEALTH

The Pre-Health concentration is a modified version of the curriculum which suffices both ABET certification requirements and the suggested courses for the MCAT. This concentration can be combine with any of the above concentrations.

RESEARCH

The recommended coursework includes electives and general education requirements that will prepare students with the skills required to participate in research.

Course Advising



Confusion about class choices can be a source of anxiety for BME students. There is a multitude of web resources that you should utilize to choose your classes, however, your number one resource is your advisor. As a freshman, your classes are typically the same as other freshmen, but a meeting with your advisor before you commence the second semester is a good idea.

Your second resource is the course catalog. The catalog entry for the BME undergraduate program includes links to all course descriptions for all your undergraduate classes and includes a list of concentration electives.

Your third resource is the BME department's advisement page. Here, you will find the two most important forms of your undergraduate career. First is the Advisement Form. This form is concentration-specific and includes a version for undecided students, like you. It tracks your progress through your undergraduate career for your advisor's reference. Second is the Registration Form. You and your advisor will complete this form, which is not concentration specific, to approve your course selections for the next semester. Both these forms will need to be filled out before a meeting with your advisor. Ensure you use a PC with Adobe Reader 11 to complete these forms, as using Preview on OSX or an older version of Reader will cause formatting issues on your advisor's computer.

Honors students must complete an additional advising session with an honors advisor, with an additional set of forms. Consult your Honors Freshman Handbook for more information.


Get Involved

RESEARCH

Undergraduate research experience can be a valuable addition to your resume. Though it is not impossible to become involved, it will take effort on your part; no professor will ask you to become involved. It is your responsibility to seek out a position. Before pursuing a professor about a research position, educate yourself. The BME department's faculty page is a good resource. Find a publication that interests you, and ask good questions about it. You can contact professors by email or in person, during their office hours. During your BME 101 course,you will be introduced to the research of many faculty members in the department. These professors may be a good place to start.

BME offers suggested coursework for those interested in combining their concentration with research.

You may want to look into the NJIT's Undergraduate Research and Innovation Programs.

CLINICAL EXPERIENCE

Clinical experience maybe available at various local hospitals and universities, including the University Hospital, Newark Beth Israel Medical Center, St. Joseph's Medical Center, St. Michaels Medical Center, and the VA Medical Center. Talk to your Pre- Health advisor for more information about gaining clinical experience during your undergraduate career.

CLUBS OF INTEREST

BMES – Biomedical Engineering Society.

Tau Beta Pi – The Engineering Honor Society.

NSCS – National Society of Collegiate Scholars.

Delta Epsilon Iota – Academic Honor Society.

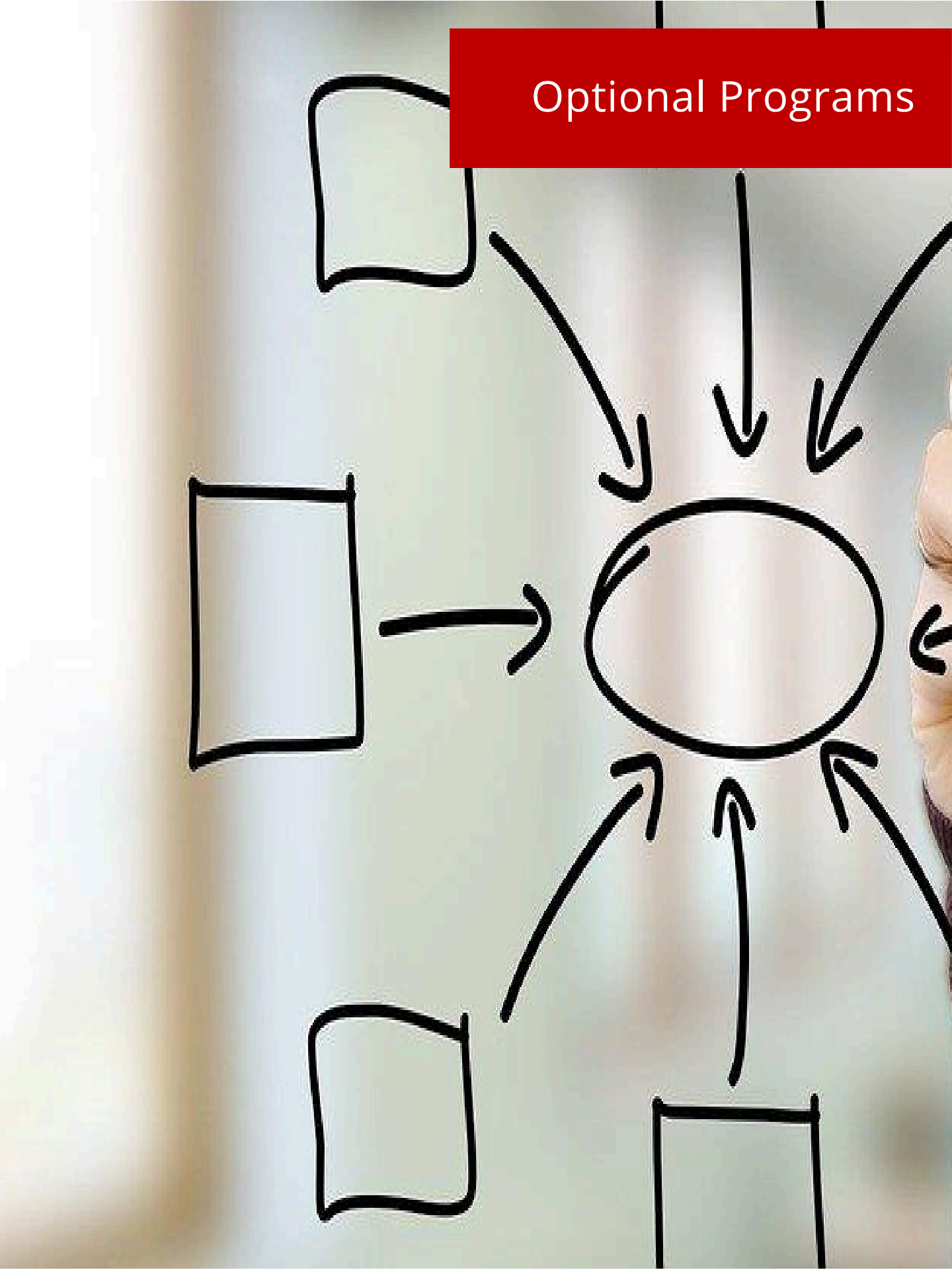
Phi Eta Sigma – Freshman Honor Society.

Ambassadors – Student representatives of the BME department. Responsibilities include assistance at Open House days through out the semester.

Student Senate – The undergraduate student government organization of NJIT.

Learn more about membership in the above organizations by contacting a member.

Optional Programs



PRE - HEALTH EDUCATION

Specific classes may be required for entrance into medical degree programs. At NJIT, pre-health is not a major, but a track of classes to be taken in addition to your major. Additionally, a pre-health advisor will work with you, alongside your major advisor, to ensure you are on the right track for completing the required classes.

MINORS

Some minor programs are particularly compatible with the BME major. These include Chemistry, Biological Sciences, Applied Mathematics, Applied Statistics, Mathematical Biology, Applied Physics, and Nanotechnology. See your BME advisor to find out how minor courses can suffice BME approved electives; see an advisor in the department hosting the minor for more details about the minor.

CO-OPS

Cooperative Education provides students with paid, professional, and for-credit work experience before graduation, within the area of your major. Overseen by a faculty advisor within your department. Contact Career Development Services for more information.

BS/MS

Earn your Master of Science in Biomedical Engineering degree within one year of completing your undergraduate degree. Take graduate-level classes your senior year to count towards your undergraduate and graduate degrees. You must have a 3.0 GPA or greater to be admitted. In your senior year, you will take 6 credits at 600 level or higher, which will suffice BME-approved electives and MS course requirements. Talk to your BME advisor and Dr. Roman, the MS coordinator.

INTERNSHIPS

Similar to a Co-Op. May or may not be paid or for credit. Contact Career Development Services for more information.

Academic Resources

CAREER DEVELOPMENT SERVICES	Provides networking opportunities, job placement services, and resume assistance, as well as many online resources.
CCAPS	Center for Counseling and Psychological Services. Provides mental health services for students.
DEGREEWORKS	Accessible through the Highlander Pipeline's Student Services tab. This tool monitors your academic progress, ensures that you are taking all classes required for graduation, and allows degree planning to map out future semesters. Also provides GPA calculations.
HIGHLANDER PIPELINE	Course registration, bill payment, and many important links are located here.
MATH TUTORING CENTER	Provides specialized help for most 100--and 200--level math courses.
CANVAS	Web resource to connect students and professors. Some courses may assign homework and distribute lectures through this site.
SCHEDULE BUILDER	An unofficial schedule-building tool with a very user-friendly design. Do not rely on this site alone, it is just an easier and prettier version of NJIT's official schedule builder.
THE LEARNING CENTER	The Learning Center provides tutoring, academic coaching, and workshops throughout the semester. This resource is especially useful for 100/200 level courses.
VAN HOUTEN LIBRARY	Provides access to physical books, study spaces, and online journal databases, as well as computing facilities and printing services.
WEBMAIL	A school-wide email service, attached to your UCID.
WRITING CENTER	Provides one-on-one writing help, from generating ideas to draft revision.

Frequently Asked Questions

What is MATLAB? Do I need to know how to write code already?

MATLAB, short for Matrix Laboratory, is a numerical computing environment and programming language. Essentially, it is a very intelligent calculator. Your FED 101 and BME 210 courses are designed to introduce you to the basics of the language. NJIT provides a license for you to download and use MATLAB on your personal computer here. Prior programming experience is not necessary to learn to use MATLAB, but it may be helpful. CodeAcademy teaches Python, a language similarly structured to MATLAB. Again, though not necessary, this experience may be helpful to you. MATLAB will be used in almost all of your BME classes.

Do I need to prepare for classes before the summer is over?

Summer preparation is not a necessity, but it cannot do any harm. A summer review of mathematics and an anatomy and physiology textbook should suffice.

Should I take Calculus-II my first semester? I heard that it's really hard at NJIT.

You heard correctly, the course is difficult. If your high school AP Calculus curriculum was rigorous, and you scored a 4 or 5 on the AP exam, you may be permitted to skip Calculus-I. Look at the course syllabi for Calculus-I and II here, and decide whether or not you are sufficiently prepared in the Calculus-I topics to cover the materials in Calculus-II.

Help? I have absolutely no idea what to do about anything!

Relax. Find a fellow BME student, and make a new friend. Other students are your most valuable resource for success at NJIT. Talk to upperclassmen for advice as well. Contact C-CAPS if you're having a particularly difficult time. Relax again. Take a nap. You'll be just fine.

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