BME Freshman Survival Guide

To access hyperlinks in this handbook, please view it on the BME department's website, at biomedical.njit.edu/academics/StudentHandbook.pdf

Dear Incoming Freshmen Biomedical Engineers,

Welcome to NJIT, and to the department.

The BME Freshman Survival Guide was first published for the Class of 2018. Its purpose, and our intention, is to provide incoming students with a general overview of the functions and intricacies of the BME department, as it differs from the rest of NJIT. This handbook contains pertinent information about academics, registration, tutoring services, web services, and faculty. The handbook is interspersed with student interviews, and contains an FAQ section. We hope that this handbook provides you with a one-stop-shop for almost any questions you may have during your first two semesters in the program.

This handbook was written by students, for students, under the auspices 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.

The 2015 Edition Survival Guide Writers

Before You Begin

The transition from high school to college is one of the biggest 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 be met by 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 in order to reach success.

The demanding curriculum can be made simpler with the inclusion of **AP Credits**. However, you must be careful regarding what will count and what will not count towards the Biomedical Engineering curriculum. In order for AP Credit to count towards the major, the scores must be sent to NJIT, at which the appropriate departments will review them and confirm whether or whether not they are accepted. As a general rule, an AP score of 4 or higher will count as credit for most courses. To view a full list of what will count and what will not, check here.

For students enrolled in the Pre-Medicine track:
AP Biology credits will not count. A college level Biology course must be taken, typically at Rutgers. 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 good grade (a C or higher) in the course in order for the course credit to transfer.

Track Descriptions

As a Biomedical Engineer, there are three different tracks, or specializations, that you may choose from at the conclusion of your sophomore years. Biomedical engineering students combine a study of fundamental physiological and biological fundamental processes with a study of engineering methods. The bioinstrumentation track utilizes electrical engineering methods extensively. The biomechanics track brings both mechanics and mechanical engineering methods together. The biomaterials and tissue engineering track employs tools from chemical engineering and materials science. These specialty areas frequently depend on each other. Often a specialized biomedical engineer who works in an applied field will use knowledge gathered by biomedical engineers working other areas of specialization. For example, the design of a prosthetic leg is greatly aided by the biomechanical study of the leg. The forces that are applied to the hip must be considered in the design and material selection for the prosthesis. The selection of appropriate materials used at the skin-device interface in these devices falls within the realm of the biomaterials engineer. Additionally, the design of systems to electronically control the prosthetic requires knowledge of electronic principles. This example illustrates the interactions among the specialty areas of biomedical engineering.

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

Track Descriptions

Bioinstrumentation

Bioinstrumentation is 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 track is a modified version of the Biomaterials track, which suffices both ABET certification requirements and the suggested courses for the new MCAT.

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 track electives.

Your third resource is the BME department's advisement page. Here, you will find the three most important forms of your undergraduate career. First is the Advisement Form. This form is track 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. This form, which is not track specific, will be completed by you and your advisor to approve your course selections for the next semester. Both these forms will need to be filled out prior to a meeting with your advisor. Ensure that you use a PC with Adobe Reader 11 to complete these forms, as using Preview on OSX or using an older version of Reader will cause formatting issues on your advisor's computer. Third, and last, are the Prerequisite Tree forms. These forms, though seemingly confusing messes of multicolored arrows, illustrate which courses must be taken as prerequisites to others. Use them as well as the course catalog and Advisement Form to determine which classes to take each semester.

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.

Later in your undergraduate career, you may want to look into the department's NEURON program, a summer research position for rising juniors and seniors.

Clinical Experience

Clinical experience may be 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 premedicine 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 throughout 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

Premedical Education – Specific classes may be required for entrance into medical degree programs. At NJIT, Premed is not a major, but a track of classes to be taken in addition to your major. Additionally, a premed 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 CDS for more information.

Internships – Similar to a Co-Op. May or may not be paid or for credit. Contact CDS for more information.

BS/MS – Earn your Master of Biomedical Engineering degree in one year after completing your undergraduate degree. Take graduate-level classes senior year to count towards both your undergraduate and graduate degrees. You must have a 3.0 GPA or greater to be admitted. 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.

Accelerated Programs – Programs designed to enable students to complete their undergraduate degree in three years, completing the BS degree in the first year of graduate school. The BME major is compatible with this program.

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.
Moodle – 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 – Formerly the Center for Academic and Personal Enrichment (CAPE), The Learning Center provides tutoring, academic coaching, and workshops throughout the semester. This resource is especially useful for 100- level courses.
Van Houten Library – Provides access to physical books, study space, and online journal databases, as well as computing facilities and printing services.
Webmail – 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 CS 101 course is designed to introduce you to the basic 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 Calc 2 my first semester? I heard that it's really hard at NJIT.

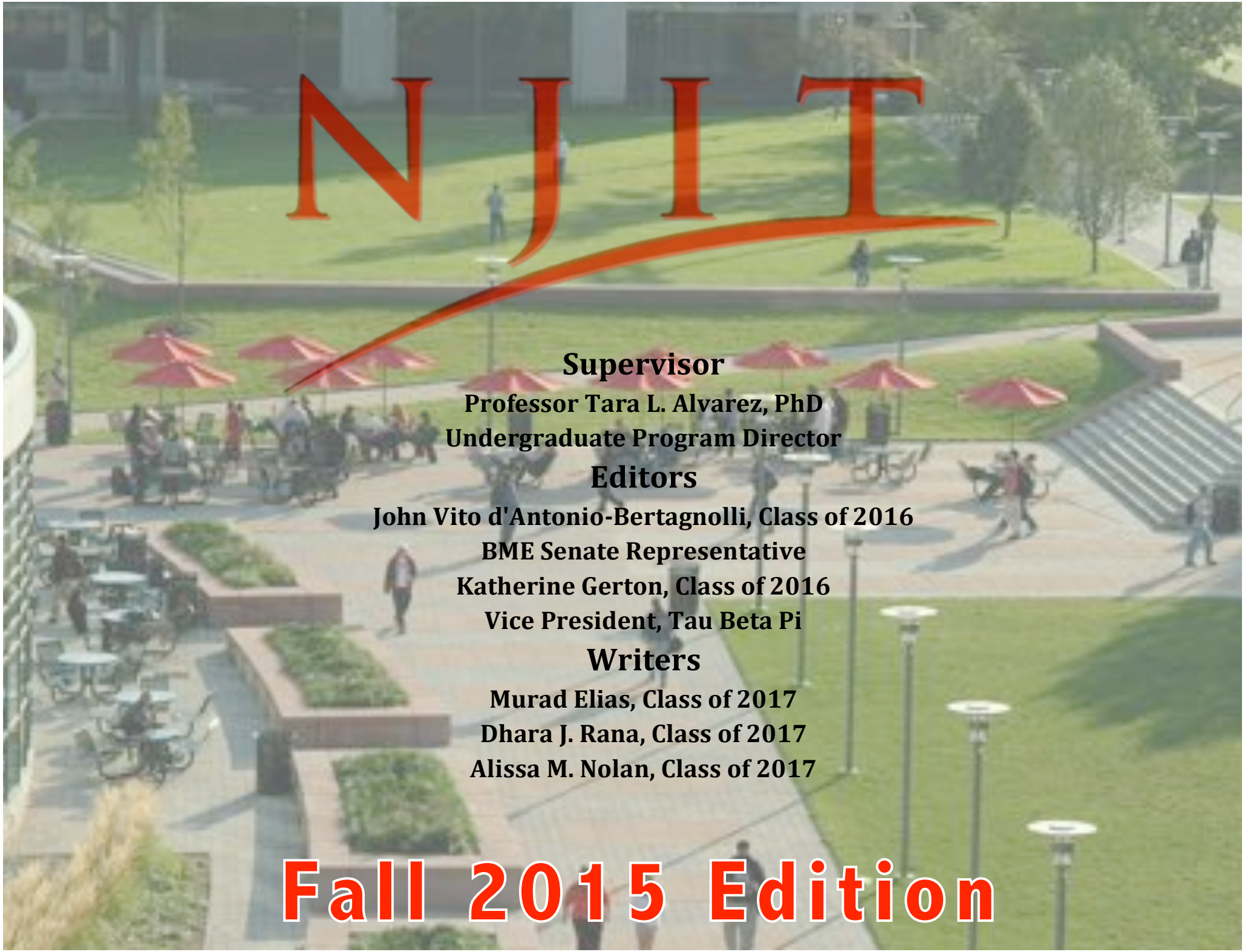
You heard correctly, the course is difficult. If your high school AP Calculus curriculum was rigorous, and you scored a 4 or 5 on the AP exam, you may be permitted to skip Calculus 1. Look at the course syllabi for Calc 1 and 2 here, and decide whether or not you are sufficiently prepared in the Calc 1 topic to cover the materials in Calc 2.

I listened to Dr. Mantilla in BME 111, and took great notes, but I still failed my first test! Why?

Did you open your textbook, or just use your notes? Dr. Mantilla's lectures augment the information covered in the textbook; he does not cover every single detail. It is your responsibility to learn the material from the text on your own. This applies to your other classes as well.

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

Relax. Find a fellow BME student, 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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