BBS

Yale Biological and Biomedical Sciences PhD Program

The Yale Combined Program in the Biological and Biomedical Sciences (BBS) offers PhD students access to all of Yale's bioscience resources, with no departmental or geographical boundaries.

bbs.yale.edu

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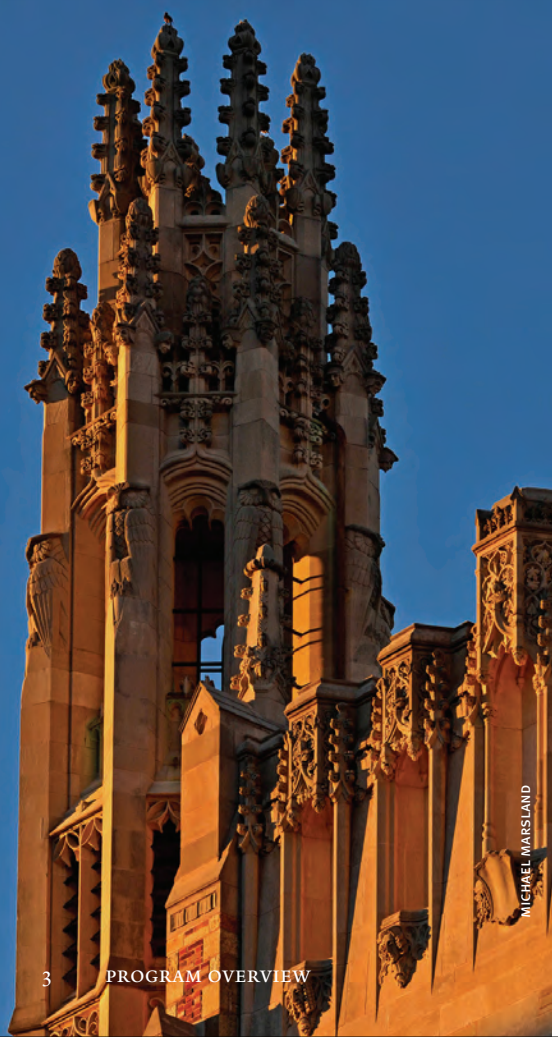
How Yale BBS Works


MICHAEL MARSLAND

Year 1

- [ ] Spend the year within one of nine scientific homes called Tracks:

1. Biochemistry, Quantitative Biology, Biophysics & Structural Biology (BQBS)
2. Computational Biology & Biomedical Informatics (CBB)
3. Human Genome Sciences (HGS)
4. Immunology
5. Microbiology
6. Molecular Cell Biology, Genetics & Development (MCGD)
7. Neuroscience
8. Plant Molecular Biology (PMB)
9. Translational Molecular Medicine, Pharmacology & Physiology (TMMPP)

- [ ] Take two to four **courses** per semester.
- [ ] Conduct three **lab rotations**.
- [ ] Join a **thesis lab** at the end of the first year.


JON ATHERTON

1600 graduates

BBS students teach for 2 semesters

Year 2

- [ ] Join the PhD program below that best aligns with the thesis lab and research project:

  Cell Biology

  Cellular and Molecular Physiology

  Computational Biology and Biomedical Informatics

  Genetics

  Immunobiology

  Interdepartmental Neuroscience Program

  Microbiology

  Molecular Biophysics and Biochemistry

  Molecular, Cellular, and Developmental Biology

  Pathology and Molecular Medicine

  Pharmacology

  Translational Biomedicine

- [ ] Complete course requirements.
- [ ] Pass a qualifying exam.
- [ ] Begin thesis research.
- [ ] Begin teaching.

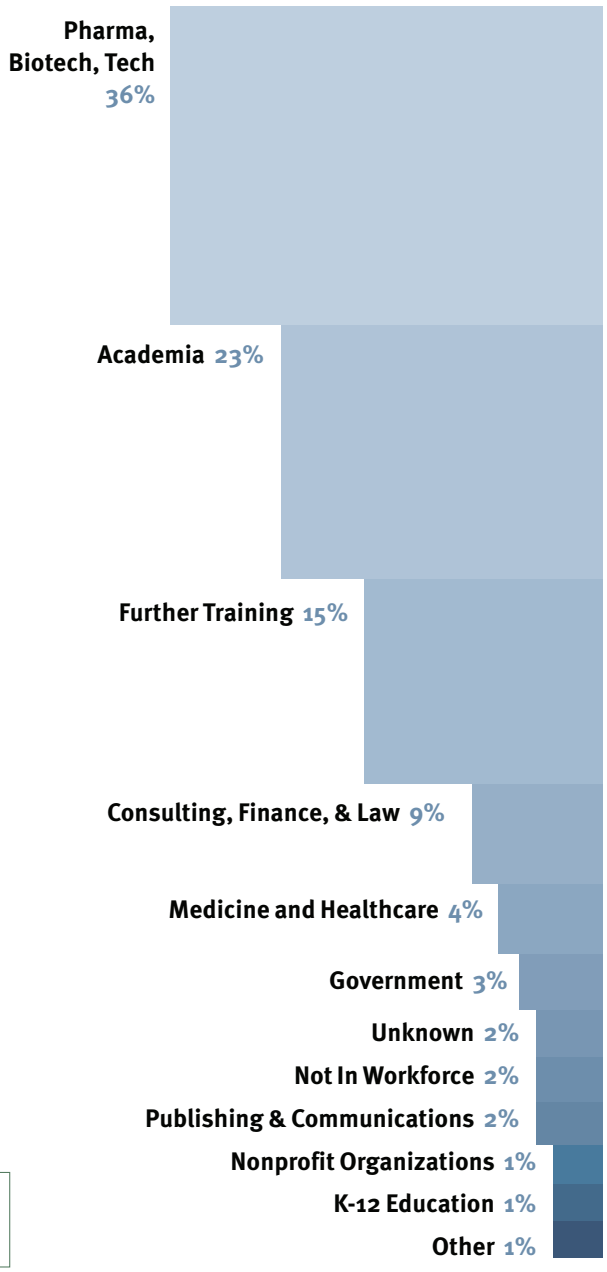
3 research campuses

5.7 years
median time to degree

Year 3+

- [ ] Focus on thesis research and publishing results.
- [ ] Finish teaching.

Career Path of BBS Graduates 2001–2024



Application Process

Read the BBS website and this guide carefully before submitting an application.

Each Track has its own admissions committee, its own first year curriculum, and its own set of research specialties.

You may apply to only one Track.

APPLICATION
gsas.yale.edu/admissions

DEADLINE
December 1

INTERVIEWS
January or February

TEST SCORES
no GREs required;
minimum 100 on TOEFL

SUCCESSFUL APPLICANTS

Prior Research Experience Tracks seek applicants with relevant research experience as an undergraduate, masters degree student, research assistant, or postbaccalaureate trainee. The most successful applicants have at least several months of research experience prior to applying.

Your Statement of Purpose on the application should highlight your research experience and demonstrate your understanding of the subject you studied.

Future Plans Admissions committees look for applicants committed to becoming leaders in research and research-related careers. Use your Statement of Purpose to outline your anticipated career plans.

Prior Coursework There is no minimum GPA, but grades in science and math courses are carefully considered.

BBS Admissions Statistics

	Number of Applicants	U.S. applicant acceptance rate	Non-U.S. applicant acceptance rate	Overall acceptance rate
2025–26	3,590	12.5%	3.3%	7.5%
2024–25	3,156	13.5%	4.0%	8.6%
2023–24	2,526	16.9%	4.2%	10.3%
2022–23	1,975	20.9%	6.3%	13.8%

490 faculty

700 current students

TRACK-SPECIFIC COURSE REQUIREMENTS

Biochemistry, Quantitative Biology, Biophysics & Structural Biology (BQBS)
Courses in biochemistry; general, organic and physical chemistry; physics; and calculus.

Computational Biology & Biomedical Informatics (CBB)
Strong foundation in the basic sciences, such as biology, chemistry, physics, and mathematics and have training in computing/informatics, including significant computer programming experience.

Microbiology
Undergraduate coursework in biology, chemistry at least through organic chemistry, physics, and calculus.

Human Genome Sciences (HGS)
In addition to meeting general BBS requirements, applicants are expected to have a strong foundation in the basic sciences (biology, chemistry, mathematics, etc.), fundamental understanding of molecular biology, and basic programming skills (e.g., R and Python).

Immunology
Preference for courses in biology, organic chemistry, biochemistry, genetics, cell biology, physics, and mathematics. Actual course requirements are not fixed, and students with outstanding records in any area of the biological sciences may qualify for admission.

Molecular Cell Biology, Genetics & Development (MCGD)
Undergraduate coursework in biology, chemistry at least through organic chemistry, physics, and calculus.

Neuroscience
Undergraduate coursework in biology, chemistry at least through organic chemistry, physics, and calculus.

Plant Molecular Biology (PMB)
Strong foundation in basic sciences, such as biology, chemistry, physics, computer science, or mathematics.

Translational Molecular Medicine, Pharmacology & Physiology (TMMPP)
Strong background in the biological, chemical, and/or physical sciences. Courses in biology, biochemistry, organic and physical chemistry, and mathematics at least through elementary calculus are recommended.

69% U.S. and U.S. Permanent Residents

31% International

BBS Tracks

Each Track has its own scientific focus, summarized on the following pages.

BBS faculty often have expertise that spans multiple Tracks and may participate in two to three Tracks.

JON ATHERTON

BQBS

TRACK 1

Biochemistry, Quantitative Biology, Biophysics & Structural Biology (BQBS)

Training that bridges atomic, molecular, and cellular scales and is designed to equip students with a broad molecular and quantitative skillset to study fundamental questions in biology.

105

Faculty with expertise in the following research areas:

Cell Cycle and Signal Transduction Cytoskeleton

DNA Dynamics and Transcriptional Regulation

Drug Design, Discovery, and Mechanism

Mechanobiology: from Cell-Cell Interactions to Tissue Mechanics

Membrane Biology

Neuroscience

Protein Folding, Dynamics, and Degradation

RNA Processing and Ribonucleoprotein Machines

Sensory Systems from Molecules to Cells to Organisms

Theoretical Biology

Virology, Infection, and Immunity

KYRILLOS ABDALLAH

Track
BQBS

Neighborhood
East Rock

Commute time from home to lab
~25 minutes

Favorite weekend activity
Hiking up East Rock Park!

For more info:
tinyurl.com/bbsBQBS

Contact:
bqbs.registrar@yale.edu

CBB

TRACK 2

Computational Biology & Biomedical Informatics (CBB)

For those who seek to develop computational, informatics, and data science methods applied to research domains in biology or biomedicine, such as electronic health records, genomics, and computational modeling of biological systems.

80

Faculty with expertise in the following research areas:

Computational Genomics

Macromolecular Structure & High-Resolution Imaging

Computational & Systems Immunology

AI Models and Distributed Analytics & AI Model Evaluation

Machine Learning Techniques & Efficient Algorithms

For more info:
tinyurl.com/yaleCBB

Contact:
cbb-registrar@yale.edu

STUDENT SPOTLIGHT

KRITI AGRAWAL

Track
CBB

Neighborhood
Science Park

Commute time from home to lab
25-minute walk, 10-minute bike ride

Favorite weekend activity
I love exploring Connecticut on the weekends! I'm from California and Connecticut has a lot of unique natural beauty. I love driving to new cities and trying new restaurants!

TRACK 3

Human Genome Sciences (HGS)

HGS centers on genetic and genomic approaches to understand human biology and disease. Training encompasses three core domains:

1) Human genetics and genomics, including the interpretation of human genetic variation

2) Experimental studies in model systems to understand how genetic variation influences human biology and disease

3) Computational approaches to obtain biological insights from complex human genomic datasets.

25

Faculty with expertise in the following research areas:

Genome Biology

Human Genetics

Functional Genomics

Epigenomics

Population and Evolutionary Genetics

Genome Technologies

Computational Genomics

For more info:
tinyurl.com/bbsHGS

Contact:
bbs.hgs@yale.edu

IMMUNO

TRACK 4

Immunology

For students interested in interdisciplinary training and collaborative and interactive research delving into the molecular, cellular, and genetic underpinnings of immune system function and dysfunction during development, pathogen and microbiome encounter, cancer, genetic disease, and in a variety of autoimmune and inflammatory disorders.

60

Faculty with expertise in the following research areas and scientific approaches:

Advanced Imaging Approaches

Autoimmunity, Allergy, and Transplantation

Cancer Immunology

Human Immunology

Inflammation and Homeostasis

Leukocyte Development and Differentiation

Microbiome and Immunology of Barrier Tissues

Mouse Modeling

Neuroimmunology

Response to Infection

Systems and Computational Immunology

For more info:
tinyurl.com/bbsIMM

Contact:
immuno@yale.edu

STUDENT SPOTLIGHT

SOFIA VELAZQUEZ

Track
Immunology

Neighborhood
East Rock

Commute time
~20–30 minutes

Favorite weekend activity
During the warmer months I love biking and hiking around New Haven and the surrounding towns of CT, but during the winter I like to stay in and have friends over to watch TV or go to Gryphons, the graduate student bar, to hang out with classmates.

MICRO

TRACK 5

Microbiology

For students with a strong interest and relevant prior research experiences in studying microbial-host interactions and mechanisms of microbial pathogenesis, including bacteria, viruses, and parasites.

55

Faculty with expertise in the following research areas:

Bacteria

Immunology and Host Response

Microbiome

Molecular Genetics

Parasites

Viruses

AFEEZ SODEINDE

Track
Microbiology

Neighborhood
East Rock

Commute time from home to lab
15–20 minutes

Favorite weekend activity
Playing Soccer or Squash

For more info:
tinyurl.com/bbsMICRO

Contact:
immuno@yale.edu

TRACK 6

Molecular Cell Biology, Genetics & Development (MCGD)

For students interested in addressing fundamental biological questions using cellular, genetics, molecular, and/or developmental approaches. Most MCGD students receive degrees in one of three PhD programs: *Cell Biology; Genetics; and Molecular, Cellular, and Developmental Biology.*

JOANNE VILLAGRANA

Track
MCGD

Neighborhood
The heart of downtown New Haven

Commute time from home to lab
About 15 minutes

Favorite weekend activity
I love taking long walks to the East Rock or going hiking during the weekend with my dog.

125

Faculty with expertise in the following research areas:

- Cell Biology
- Chemical Biology
- Development
- Epigenetics
- Evolutionary Biology
- Genetics and Genomics
- Human Disease
- Imaging (Super-resolution)
- Molecular Mechanisms
- Neurobiology
- Nuclear Dynamics
- Proteomics
- Quantitative and Systems Biology
- Regenerative Biology and Stem Cells
- RNA Biology
- Signal Transduction
- Synthetic Biology

For more info:
tinyurl.com/bbsMCGD

Contact:
bbs.mcgd@yale.edu

NEURO

TRACK 7

Neuroscience

For those who wish to study important problems in neuroscience, from the basic to the translational. PhD projects range across levels of investigation, including molecular, cellular, circuits, systems, anatomical, and behavioral, or may be integrative and use approaches at multiple levels.

150

Faculty with expertise in the following research areas:

Behavioral and Systems Neuroscience

Computational Neuroscience/Modeling

Molecular/Cellular Neuroscience

Neural Development and Neural Repair

Neurodegeneration/Neurological Disorders

Neurogenetics and Neurogenomics

Neuroimmunology and Brain-body Integration

Neuropharmacology

Neurophysiology

Neuroimaging

Psychiatric Illnesses and Addiction

For more info:
tinyurl.com/bbsNEURO

Contact:
bbs.neuro@yale.edu

STUDENT SPOTLIGHT

ATAGUN (ATA) ISIKTAS

Track
Neuroscience

Neighborhood
Downtown, 9th square

Commute time from home to lab
It takes about 5 minutes by bike and 10 minutes if I walk.

Favorite weekend activity
I really enjoy the Amtrak route to Boston, great views of the coast.

PMB

TRACK 8

Plant Molecular Biology (PMB)

For students committed to pursuing research in plant sciences and who are interested in cross-disciplinary approaches to plant biology.

14

Faculty with expertise in the following research areas:

Epigenetic Regulation and Genome Engineering

Genetic Diversity and Genome Engineering

Glycobiology and Mass Spectrometry

Metagenomics and Bioremediation

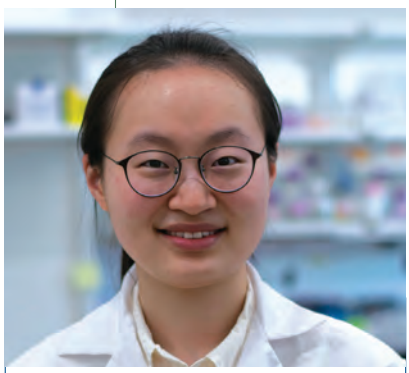
Photosystems and Bioenergy

Plant Circadian Clock and Protein Degradation

Plant Development, Stem Cells, and Organogenesis

For more info:
tinyurl.com/yalePMB

Contact:
yannick.jacob@yale.edu



WENYI RAN

Track
PMB

Neighborhood
East Rock

Commute time from home to lab
15 minutes

Favorite weekend activity
Hiking

TMMPP

TRACK 9

Translational Molecular Medicine, Pharmacology & Physiology (TMMPP)

For those who wish to use the tools of biochemistry, cell and molecular biology, physiology, structural biology, systems biology, and genetics to investigate mechanisms of disease and pathogenesis, development and molecular actions of therapeutics, and cooperation of genes, proteins and small molecules to produce the specific functions of cells, tissues, and organs.

185

Faculty with expertise in the following research areas:

- Bioengineering
- Cancer Biology and Therapeutics
- Cytoskeleton and Cell Migration/Morphogenesis
- Genetics, Genomics, and Proteomics
- Hematology, Vascular Biology, and Inflammation
- Human Disease Pathology, Physiology, and Intervention
- Ion Channels, Pumps, and Transporters
- Membrane Biology and Biophysics
- Metabolism
- Neurobiology, Neural Networks, and Neuropharmacology
- Organ Physiology
- Protein Sorting and Trafficking
- Receptors and Signal Transduction
- Sensory Physiology
- Stem Cell Biology
- Structural Biology
- Systems Biology
- Virology and Immunology

For more info:
tinyurl.com/bbsTMMPP

Contact:
tmmpp@yale.edu

STUDENT SPOTLIGHT

AMOS ESPINOSA

Track
TMMPP

Neighborhood
Downtown New Haven, in the Chapel Street District.

Commute time from home to lab
Because my lab is in the medical campus, walking takes ~15 minutes. I also own an electric scooter which shortens it to ~3 minutes!

Favorite weekend activity
I enjoy using the weekend to catch up on my cardio exercise — either though the Payne-Whitney Gym or through a nice hike with friends in the Sleeping Giant or East Rock Parks. Sometimes, my friends and I take the train down to New York City for a short escape from New Haven.

Thriving at Yale

BBS and Yale together welcome students from all backgrounds and aim to ensure that all students thrive in graduate school and beyond.

Students run their own groups

that are open to everyone in the Graduate School community.

Groups include the Yale BBS Development and Involvement Community (YBDIC), Yale Society for Advancement of Chicanos/Hispanics and Native Americans in Science (Y-SACNAS), Women and Gender Minorities in Science at Yale (WISAY), and the Graduate Student Disability Alliance (GSDA).

Application fee waivers

are granted to those who demonstrate financial hardship, and all admitted students receive a relocation package, free family health insurance, heavily discounted dental insurance, full tuition coverage, and a stipend that more than covers the cost of living in New Haven.

The Student Accessibility Services Office

provides services to remove barriers for students with short term and chronic disabilities.

BBS has a faculty Director of Collaborative Excellence

who works closely with the School of Medicine and Graduate School Deans' offices in providing support to all students.

Yale has several cultural centers open to all students.

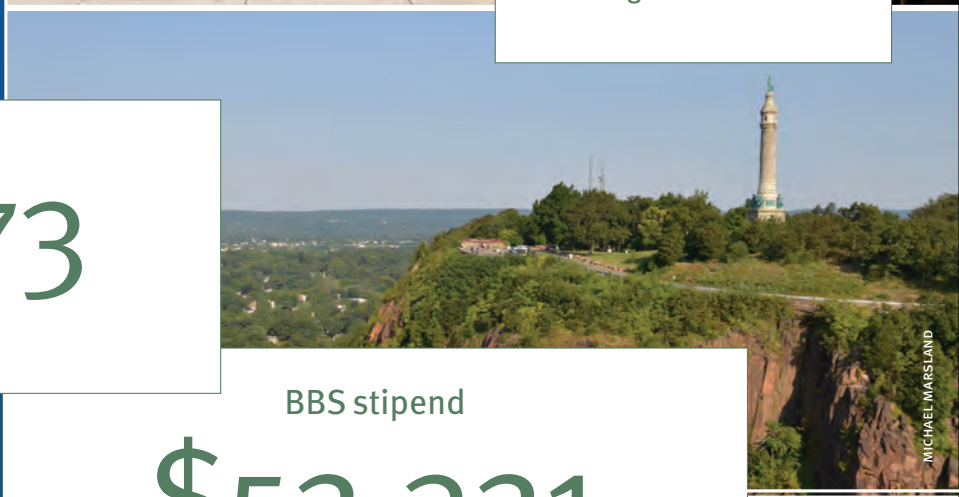
Student Life

ANDREW HURLEY

Most students live within easy walking or biking distance of campus, and Yale has a free shuttle system for transporting students to and from campus day and night.

Cost of living

$42,973



MICHAEL MARSLAND

BBS stipend

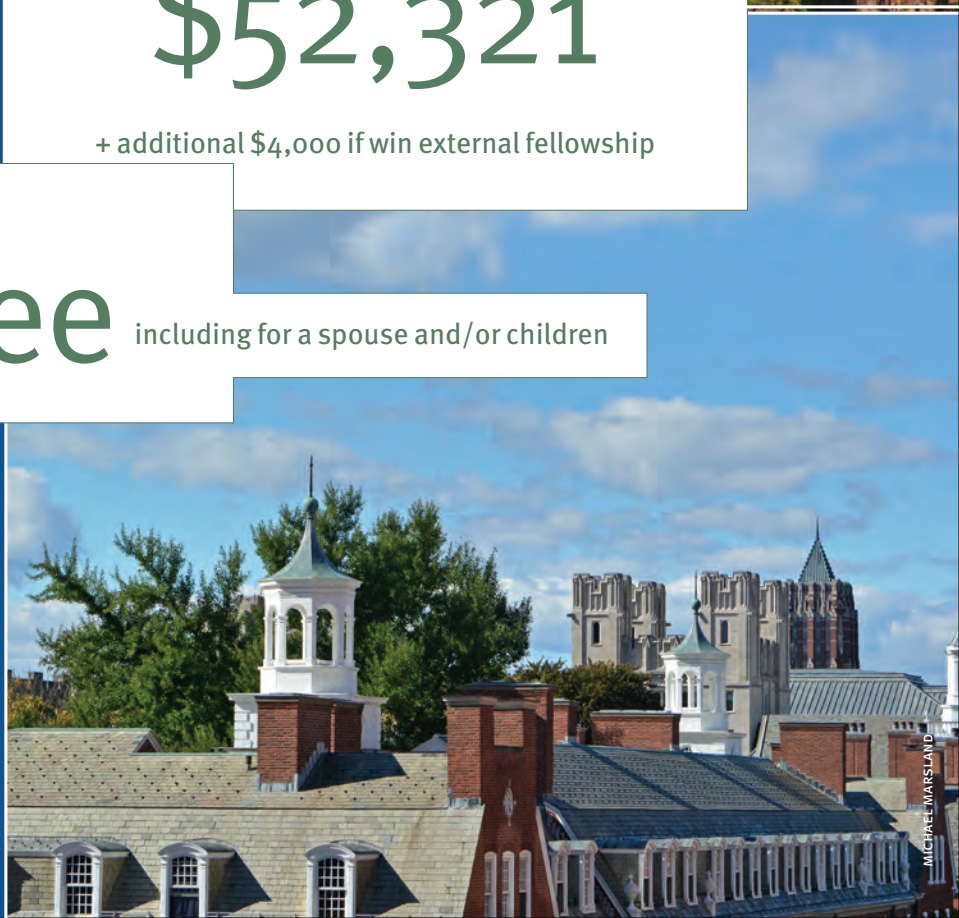
$52,321

+ additional $4,000 if win external fellowship

Health insurance

Free including for a spouse and/or children

Yale has its own on-campus health care facility for students, faculty, and staff.



MICHAEL MARSLAND


MICHAEL MARSLAND


COURTESY OF CITYSEED


MICHAEL MARSLAND


TOM MIGDALSKI

Yale and New Haven together are Connecticut's center for the arts, music, entertainment, and dining.


JOAN MARCUS

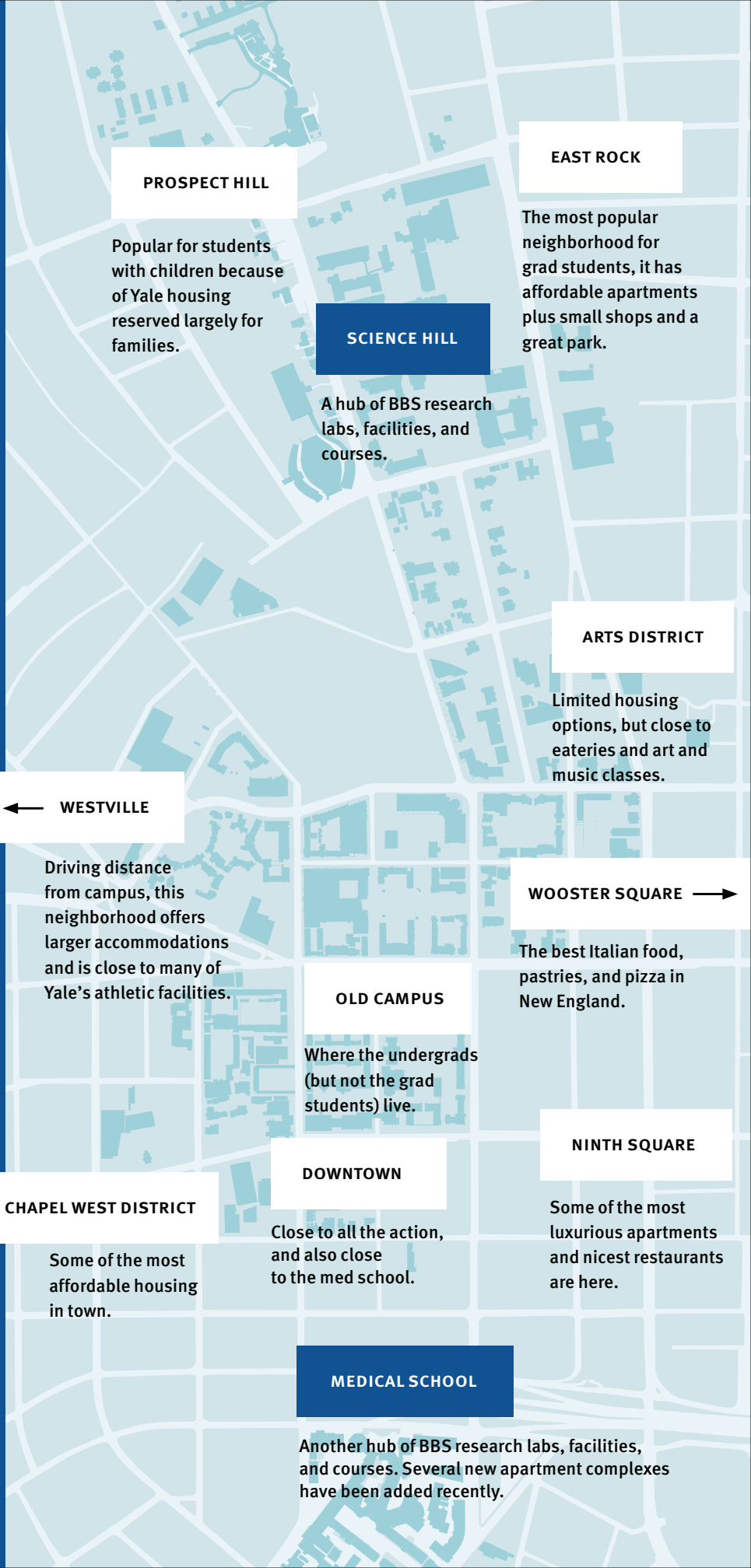
Campus and New Haven

The neighborhoods around the Yale campus are diverse in style and offerings. Some have high rise luxury apartments whereas others are comprised of free-standing homes. Some support cozy cafés while others host fine dining establishments. Virtually all are close to campus, and each is home to students and faculty.

Yale shuttles are equipped with GPS devices for tracking on a computer or smart phone.

There are wonderful shoreline communities and a convenient commuter rail into New Haven.

New Haven has one of the highest apartment occupancy rates in the U.S., with many new buildings recently opening or under construction.



BBS Program *www.bbs.yale.edu*
Yale Graduate School *gsas.yale.edu*
Yale University *www.yale.edu*
New Haven *www.infonewhaven.com*

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