

4+1 Program in Animal Sciences/Endocrinology and Animal Biosciences (BS/MS)

Background and Justification

This new program of study (4+1 option) offers a student who successfully completes a 4-year B.S. in Animal Sciences to also complete an M.S. in Endocrinology and Animal Bioscience with an additional 1-year of coursework. The 4+1 option will be suitable for students in our **Pre-Vet/Research and Lab Animal Sciences options**. Up to two courses (6-8 credits) taken during the third or fourth year can be counted toward the graduate-level requirements if those credits are not counted toward the undergraduate degree.

Administrative Details

Students wishing to complete the 4+1 program apply by sending a personal statement, CV, and transcripts with at least 90 credits of coursework to EAB4plus1@SEBS.rutgers.edu by the end of the spring semester of their third year of post-secondary study (May 30th). Once approved by the UPD/GPD/EAB Admissions Committee, students can then apply to the School of Graduate Studies through the Graduate and Professional Admissions application [portal](#).

Students who apply and meet the following requirements will be accepted into the program:

- The following prerequisites completed (with C's or higher) by end of spring semester:
- For Pre-Vet/Research
 - o 11:067:142 Introduction to Animal Sciences
 - o 01:119:115-117 - General Biology I & II
 - o 01:160:161-162, 171 - General Chemistry I & II & Lab
 - o 01:670:307-308, 311 - Organic Chemistry I & II
 - o 01:640:135 or 151 Calculus
 - o 11:067:300 Integrative Physiology or 01:146:356 Systems Physiology
 - o 11:067:327 Animal Reproduction
 - o 11:067:328 Animal Genetics or 01:447:380 Genetics
 - o 11:067:330 Animal Nutrition
- For Laboratory Animal Science (LAS)
 - o 11:067:142 Introduction to Animal Sciences
 - o 01:119:115-117 - General Biology I & II
 - o 01:160:161-162, 171 - General Chemistry I & II & Lab
 - o 01:670:307-308, 311 - Organic Chemistry I & II
 - o 01:640:111/112 or 115 Precalculus
 - o 11:067:300 Integrative Physiology or 01:146:356 Systems Physiology
 - o 11:067:327 Animal Reproduction
 - o 11:067:328 Animal Genetics or 01:447:380 Genetics
 - o 11:067:330 Animal Nutrition
- A total of 90 credits by the end of their third year. For transfer students, at least 30

- credits must be taken at Rutgers before becoming eligible to apply.
- Cumulative GPA of 3.00 (including spring courses of third year)

CAVEAT: Students in the Companion Animal Science and Equine and Production Animal Science Tracks

Please contact Dr. Aparna Zama, Undergraduate Program Director, at zama@sebs.rutgers.edu or 848-932-8495.

Should an applicant not meet the requirements, the Graduate Program in Endocrinology and Animal Biosciences Admissions Committee will consider their personal statement and all other pertinent information and decide on admission to the 4+1 program.

To enter the 4+1 program, students in the LAS option track will 1) will not be required to take Physics; 2) will need to take General Biochemistry EITHER in undergrad OR in the +1 graduate part of the program; and 3) can take Basic Statistics for Research as an undergraduate student or in the +1 graduate year.

All students will be notified about acceptance into the program by June 15th.

REQUIREMENTS FOR UNDERGRADUATE MAJOR (BS) PORTION OF 4+1 (120 credits)
SEBS CORE CURRICULUM (at most 24 cr.; other parts of Core satisfied by major)

- Contemporary Challenges (6 credits), in these categories:
 - o Diversities and Social Inequalities [CC-D] (3 credits)
 - o Our Common Future [CC-O] (3 credits)
- Historical Analysis [HST] (3 credits)
- Social Analysis [SCL] (6 credits), in these categories:
 - o Social/Cultural or Economic (3 credits)
 - o Government/Regulatory (3 credits)
- Arts and Humanities [AH] (3 credits)
- Writing and Communication (6 credits):
 - [WC101] 01:355:101 Expository Writing I (3), and
 - [WCD] 01:355:302 Scientific and Technical Writing (3) or
 - 01:355:201 Research in the Disciplines (3) or
 - 01:355:301 College Writing and Research (3)

PROFICIENCY IN Animal Sciences (86 credits)

See [EAB 4 Plus 1 Program Track PDF](#).

ELECTIVES (4-5 more elective courses (12-15 credits) depending on option and 7 EBE credits)

In addition to courses meeting the above requirements, students must take enough other courses offered by the University to bring their total number of credits to the minimum of 120 required for the BS degree.

REQUIREMENTS FOR MS PORTION OF 4+1 (30 CREDITS)

Core Courses (22 credits w/o research credits, 16 w/ research credits) – at least ONE course from each core area (endocrinology (E), physiology (P), biochemistry/molecular biology (B), statistics (S)).

- E: 16:340:510 Neuroendocrinology (4)
- E: 16:340:612 Recent Advances in Endocrinology (2)
- E: 16:340:591 Reproductive and Developmental Toxicology (4)
- P: 16:963:512 Integrative Organ Physiology (3)
- P: 16:709:552,553 Nutrition: A Biochemical and Physiological Basis (4)
- P: 16:107:603 Advanced Exercise Physiology (4)
- B: 16:340:592 Molecular and Cellular Physiology (3)
- B: 16:115:503,504 General Biochemistry (4)
- B: 11:115:511,512 Molecular Biology and Biochemistry (4)
- S: 01:960:401 Basic Statistics for Research (3)
- S: 16:115:557 Statistics in Biomedical Science (3) (Fall)
- S: PHCO 0504 Introduction to Biostatistics (3) (RBHS SPH; special registration required)

Seminar (2 credits/1 per semester)

- 16:340:693,694 Seminar in Endocrinology and Animal Bioscience (1)
- 16:115:556 *Ethical Scientific Conduct* (1) (Spring)

Undergraduate Courses Counting toward Graduate Program (6-8 credits)

- 11:067:450 Endocrinology (4)
- 11:067:490 Pathophysiology (3)
- 11:067:404 Animal Diseases (3)
- 11:067:391 Comparative Mammalian Anatomy (3)
- 11:067:430 Animal Microtechniques and Tissue Culture (4)

Additional Courses of Interest

- P: 16:340:508 Equine Exercise Physiology (3) Spring/odd years
- P: 01:146:474 Immunology (3)
- B: 16:681:502 Molecular Genetics (3)
- B: 16:681:585 Cancer Molecular Biology (3)
- P: 16:709:506 Nutritional Aspects of Disease (3)
- P: 16:963:603 Advanced Problems in Toxicology (1) Fall
- P: 16:963:631 Toxicological Pathology (3) Spring
- P: 16:572:510 Advanced Applied Human Physiology (3) Fall
- P: 16:572:511 Neurophysiology of Health (3) Spring

Six to eight credits taken during the third or fourth year can be included in the 30 total credits needed for the MS. However, these credits CANNOT be counted toward the 120 credits needed to graduate with a BS.

In addition, choose from one of the following options:

Research (6 credits)

16:340:701/702 Research in Endocrinology and Animal Biosciences (3).

Students should consult with their academic advisor to determine whether to take graduate electives in the fourth year.

Note: Students in the Class of 2023 will be given a one-time exception allowing them to apply to this program by March 20th (i.e., during their senior year).

Assessment and Learning Goals

Learning Goal 1: Attain mastery of the essential aspects of research in areas of endocrinology and integrative physiology as they relate to improving animal and human health.

Learning Goal 2: Prepare students for advanced professional degrees and for careers require training in endocrinology and integrative physiology as they relate to animal and human health.