Department of Animal Science

B.Sc. Curriculum (single major)

2020-2021

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Faculty:	
Full Professor:	Prof. Rachel Amir, Prof. Jacob Pitcovski
Associate Professor:	Prof. Dani Bercovich, Prof. Martin Goldway, Prof. Gidi Gross, Prof. Eran Dvir, Prof. Nurit Carmi, Prof. Yizhar Lavner, Prof. Segula Masaphy, Prof. Soliman Khatib, Prof. Ayelet Shavit
Senior Lecturer:	Dr. Roee Gutman, Dr. Doron Goldberg, Dr. Karen Jackson, Dr. Alon Margalit, Dr. Paula Pitsani Dr. Andrea Shochman-Sapir, Dr. Hagai Shemesh
Lecturer:	Dr Livnat Journou, Dr. Ofir Degani, Dr. Yoni Vortman, Dr. Solomon Vishkaustan, Dr. Adi Jonas-Levi, Dr. Oren Reichman, Dr. Liora Shaltiel-Harpaz Dr.
Senior Instructor:	Dr. Donita Cohen, Dr. Anatoly Spivakovsky, Dr. Oren Pearlson
PhD Instructor	Dr. Tali Goldberg, Dr. Hadas Merom Weinstein
Adjunct Lecturer:	Dr. Itai Opatovski, Dr. Aviv Asher, Dr. Alon Barash, Dr. Tzach Aharon Glasser, Dr. Smadar Tal, Dr. Itamar Yedid, Dr. Nader Mobarki, Dr. Rona Nadler Valenci, Dr. Dalia Niv, Dr. Talia Etzion, Dr. Yonatan Foyerman, Dr. Yedidya Kaplan, Dr. Yair Rezek, Dr. Boaz Shacham

Department Head: Dr. Roee Gutman

The Animal Science Curriculum

Interest in animals in their natural environment and their husbandry has increased significantly over recent decades. In addition to the traditional practice of breeding animals as a food source, animals are being bred for interest, enjoyment, education, treatment of various disorders, and use as biological models in a diverse range of medical and scientific research fields, and biodiversity conservation. As graduates of the Animal Science program, you will acquire broad knowledge and become familiar with a range of topics in biology, ecology, biotechnology, technologies for animal breeding, animal welfare, and holding conditions. You will also gain insight into topics relating to management and food, hygiene and diseases, genetics and genetic improvement, and the relationship between animals and humans, with an emphasis on legal and ethical issues. All lecturers in the professional courses hold PhD's and are also researchers, which allows us to maintain innovative, up-to-date teaching. A degree in Animal Science will pave your way towards the following activities:

A. Research and Development
   1. Research within the framework of MSc and PhD programs for graduates with appropriate grades in areas related to livestock and wildlife health or in research that uses animals as research models to human disease research.
   2. Research and development in both biotech and agrotech companies who are engaged with laboratories and private or public research institutes in the fields of life sciences engaged in the development of medicine for humans (pharmaceutical industry).
   3. Holding laboratory animals for biomedical research, which requires highly skilled workers acutely aware of animal welfare
   4. Manufacturing and marketing of equipment, instruments, food, and medicines required for breeding companion and farm animals.

B. Breeding Pets and Farm Animals
   1. Managing farms and companies who breed animals for production purposes: fish, poultry, and ruminants
   2. Management positions in zoos and petting farms, where animals are kept in captivity for educational purposes and as a means of caring for animals in danger of extinction.
   3. Breeding companion and ornamental animals, including exotic animals, from horses to birds, reptiles, and ornamental fish

C. Nature Conservation

1. Working for governmental and non-governmental organizations, including the Ministries of Agriculture, Health, and Environment
2. Preservation of animals and caring for them in their natural environment.

D. Education

1. Serving as biology and/or science teachers in schools (preferably after attaining a teaching certificate). A degree from our department affords graduates the advantage of being able to use animals for teaching purposes

E. Animal Health

1. Providing health care to animals as a Veterinarian Assistant
2. Applying for Veterinary Medicine Studies (for graduates with appropriate grades and meeting specific admission requirements) at the School of Veterinary Medicine in Israel and abroad

Our Vision

The department of Animal Science teaches and trains high-quality professionals to work with animals at the highest academic, scientific, and ethical levels and ensures they will be well equipped to cope with future challenges in this field.

Accordingly, the students will:

1. Acquire scientific knowledge across a range of topics concerning animal biology and related technologies.
2. Obtain hands-on experience in experimental methods and applied skills related to the study, conservation, treatment, care, healthcare, and welfare of animals – from the wild to the domesticated.
3. Train themselves in study skills that will enable them to improve and broaden their expertise, both within and outside of academia.
4. Will develop skills of scientific thinking in the field of animal care, and capabilities of learning and working with new materials in a world that is bursting with knowledge.

We expect our graduates to promote the ethical treatment of animals in all their future work.

Principles of the Curriculum

The three-year program includes lab courses and numerous field trips. The first year consists mainly of basic courses, such as chemistry, mathematics, and biology, as well as several specialized courses, including bioethics, zoology, histology, embryology, animal ecology, and Israel's fauna. The second-year builds on the foundations of the first, with courses such as physics, biochemistry, genetics, and microbiology, and a host of

applied core courses, such as animal nutrition, comparative animal physiology, immunology, and behavioral ecology. It is during this year that students prepare their first seminars and begin taking elective courses. During the third year, students submit advanced seminars, experimental study design, and biostatistics, and take a series of compulsory courses on fish breeding, animal care, endocrinology, and reproduction; they also complete their set of elective courses during that year. Like all students of the Science Faculty, students are required to take a 2-point course from the Humanities.

Animal Health Track

The Department of Animal Science at Tel Hai Academic College offers a unique track, focusing on animal health issues, as part of the Bachelor's degree in Animal Science. The goal of the track is to provide Animal Science graduates with theoretical knowledge and practical tools related to animal health issues. Topics covered, among others, are animal welfare and health, management, husbandry, and conservation of both domesticated animals (livestock, pets and companion animals) and wildlife animals found in zoological parks and nature reserves. It will also provide practical skills in biomedical research where students will study animal and human diseases and clinical-thought development. Equipping students with this in-depth knowledge alongside highly practical tools will increase employment opportunities for the Animal Health graduates, enabling them to integrate into organizations, companies, and research institutes as well as preparing them in the best possible way for admission to veterinary schools in Israel and around the world. Students will be introduced and exposed to several aspects related to biomedical research and the intersection between human-farming-environment. These topics are at the forefront of animal and human health research and nature conservation. There has been a significant increase in zoonotic disease (e.g., the Corona pandemic) - passing from animal to human, and there are changes in animal morbidity due to the challenges of the modern era, such as urbanization. The issue is particularly relevant to the peripheral areas, as these areas have human, livestock, and wildlife interfaces, mainly reflected in the transition of zoonotic diseases between the three. Animal Health graduates will become aware of these sensitive issues, and their exposure, research, and monitoring experience will make them more attractive to employers in the field. Biology graduates with strong practical skills in the area of animal treatment, who can communicate confidently with veterinarians and the public, are highly sought after. Working with animals is not limited to working with livestock, pets, and wildlife, but is also relevant to the biomedical research and the pharmaceutical industry - an area in great need of skilled workers. Graduates of the Animal Health track will depart as knowledgeable and compassionate professionals. We, therefore, expect that the Animal Health track will increase the possibilities of its graduates to be accepted to post-graduate studies or be hired in the free market. In recent years, much emphasis in undergraduate life sciences studies has

been placed on the micro perspective (i.e., molecular aspect), and the whole-animal perspective has, for the most part, been neglected. The animal health track will respond to this lack of knowledge by providing a unique scientific, educational, and applied curriculum.

Elective Courses

Students are required to take elective courses so that, upon completing their studies, they will accumulate a total of 140 academic credits along with the compulsory courses. Not every elective course is offered each year, and it is advised to consider this when planning your study program. Students are permitted to choose any elective as long as they meet the appropriate prerequisites. To prevent overlap with compulsory courses in the student's schedule, each elective has been allocated to at least one of the degree years, during which it will not be taught in parallel with the compulsory courses of that year.

Prerequisites

Most courses offered by the department require knowledge previously acquired in one or more courses in the curriculum. These preliminary courses are, therefore, prerequisites. If the preliminary courses were studied during the previous academic year, registration to the course is subject to receiving a passing grade in all its compulsory preliminary courses. When the preparatory course of a second-semester course is studied during the first semester of the same academic year, registration to the subsequent course is conditional upon participating in the introductory course, even if a final grade has not yet been given. If a final passing grade is not given in an introductory course, the student will be ineligible to study the following courses listed for the aforementioned compulsory course during the following academic year. A portion of the prerequisites is simultaneous, i.e., the introductory course may be studied parallel to the aforementioned consecutive course. The list of prerequisites contained in the tables herein, list only the most advanced courses in the prerequisite “chain”, if such exists.

Course Registration

Before registration to the course, it is the responsibility of each student to check the course requirements, taking note of the requisite grades needed to pass the course.

Summer Courses

Several central first-year courses, which are prerequisites to multiple other consecutive courses, are repeatedly offered in a concentrated format during the summer vacation. This arrangement enables first-year students who wish to lighten their burden to a certain extent during the first two semesters, or who failed these courses, to

avoid developing a large gap that would prevent them from attaining their degree within the standard, acceptable timeframe. Currently, the summer courses on offer are: Differential and Integral Math 2, and Cell Biology (course opening depends on the number of participants**). Changes may be made in the list of courses opening this summer, subject to various conditions and stipulations.**

Academic requirements

To achieve their degree, students must accumulate **140**-course credits, as detailed in the semester allocation tables. Students must also complete their requirements for English, Hebrew (as necessary), and bioethics, or obtain an exemption from these courses on the grounds of prior knowledge or proven participation in similar courses in the past.

Recognition of Previous Studies

The department may recognize courses taken in other academic institutions if the following conditions are met:

1. The course was studied in a recognized academic institution in Israel. Concerning institutions abroad, the Council for Higher Education (CHE) will be consulted.
2. The course grade is a "passing" grade and higher than 70.
3. The syllabi of the courses for which the student is seeking recognition and the level of the subjects studied must correlate with the course requirements, as stated by Tel-Hai College. The extent to which there is a correlation will be examined by members of the Committee for Recognizing Previous Studies. Notably, an identical title of a course does not necessarily indicate an identical syllabus and academic level.
4. Based on the instructions and guidelines of the Council for Higher Education, it is possible to recognize academic courses in the scope of up to 50% of the total credits required to attain a degree.
5. The course for which the student is seeking recognition was taken within the past **five** years.
6. The recognized course will appear in the transcript issued by the college with its grade listed as "exempt" and not be given a numeric grade score.
7. The application for requesting an exemption from academic courses should be submitted during the consultation days. **The committee will determine** – based upon confirmation of the studies, the course contents, and the student's grades – the scope of recognition of previous studies and approve the student's study program in the department accordingly.
8. According to CHE guidelines, it is possible to recognize courses studied in the framework of Practical Engineering (P.E.) schools in the scope of up to 30 academic credits required for the degree. In the case of P.E. coursework, the grade given the course must be at least 80. **Recognition of 30 credit points may be**

given solely concerning those students who have completed all their obligations for a P.E. degree (including submission of a final project).

Conditions and Stipulations for Proceeding to the Next Year

A student is entitled to progress from one scholastic year to the consecutive year after having met the following conditions and stipulations:

1. Attaining a cumulative GPA of at least 65.
2. Fulfilling the requirements of that year's compulsory courses with an appropriate (passing) grade, including English courses.
3. Transition to the next year for students on "conditional" status will depend on their achievements, and they will be evaluated periodically by the department's monitoring and follow-up committee.
4. A student who has not completed all of the first-year compulsory courses will be ineligible to enroll for third-year compulsory courses.
5. If a student was required to fulfill additional obligations upon acceptance to the study track (e.g., submission of a P.E. diploma, completion of matriculation grades, etc.), and did not comply within the allotted time, the department may discontinue his or her studies immediately. Any student unable to fulfill such requirements may submit an appeal to the teaching committee to enable his or her continued enrollment; the committees will deliberate whether to allow it and under which conditions.
6. Prior to enrollment for an advanced seminar, every student must reach the English exemption level, regardless of the level at which he or she began their studies, except for those initially admitted with an exemption. Students may not enroll for an advanced seminar without an English exemption; as a rule, enrollment for English courses is to be executed by and under the responsibility of the student during the department's assignment days.
7. A student who has **twice** failed a departmental compulsory course will be expelled from his studies in the department. In exceptional circumstances, and according to a decision made by the department head or the departmental teaching committee, the student will be permitted to re-enroll for the aforementioned course and continue his/her studies under the conditions and stipulations determined by the department.

Any student who did not fulfill these requirements is entitled to appeal and request permission to continue his/her studies, and the teaching committee will determine the terms, conditions, and stipulations by which he/she may do so.

Eligibility for a Degree

A student will be eligible for an undergraduate degree (B.Sc.) from the Department of Animal Science after fulfilling the following academic obligations:

1. Accumulated 140 credits and completed the requirements of all compulsory courses. A minimum grade of 56 is required to pass and receive the appropriate course credits. **It is the exclusive responsibility of each student to verify they have accumulated the required number of academic credits to be eligible for their degree**.
2. Attained a cumulative average of at least 65 upon completion of the degree studies.
3. Fulfilled the requirements for progressing from one year to the next as described as in the section above.

Spreading your Studies

Out of consideration for our students, it is possible to extend your studies for four years. Students interested in such an extension which are not registered at the Support Center for Students with Learning Disabilities, must receive a signed approval from the department head. Those admitted to the Support Center for Students with Learning Disabilities must spread their years of study congruent with the center's guidelines. There is a standard program of extended studies at the college, which obligates both students registered with the center and those seeking to spread their years of study on their own account. This program prevents **as much as possible** any overlap in scheduled class hours or exams as a consequence of taking courses from different years during the same semester. **Any extension of studies not executed according to the aforementioned program is the student's responsibility, and the department cannot guarantee in any way that there will not be conflicts in the curriculum or exam schedule.**

English Course Requirements

Subsequent to a decision of the CHE, English language studies are a compulsory component of degree eligibility. All students are obligated to begin English studies during their first year of study as follows:

- Students whose level has been determined as 'pre-basic A', 'pre-basic B', or 'basic' are required to study English **starting from their first semester**.
- Students whose level has been determined as 'advanced A' or 'advanced B' are required to study English **starting from the first or second semester of their first year of studies.**
- In addition, all students are required to attain an 'exempt' level of English prior to their enrollment in any of the college's seminars and/or advanced courses. **Enrollment in any seminar courses and/or advanced/final project courses will not be possible without prior attainment of an 'exempt' level in English.**

As a rule, it is the sole responsibility of the student to enroll in English language courses during the departmental course assignment days.

Institutional Requirements

Every student at Tel-Hai must take at least one 2-credit course of humanities during their three years of degree studies. In addition, students may choose courses from a multidisciplinary pool in a scope of 2 to 4 credits. The objective of this regulation is to enrich the students' spiritual world and expand their horizons. These pools include:

1. Humanities courses – one 2-credit course must be selected from the pool of the Faculty of Social Sciences and Humanities.

   Multidisciplinary courses – students may select a minimum of 2 and a maximum of 4 credits from a list of courses from both the Faculty of Sciences and the Faculty of Social Sciences and Humanities.

Exempt from this requirement are (a) students who are obligated to study the Expression and Rhetoric course, and (b) students who are obligated to take the course titled Studying With and About – Theoretical and Applicational Aspects of Disabilities.

Expression and Rhetoric Course Requirement

Students who during the admission process were admitted with an additional requirement to take the Expression and Rhetoric course will be awarded two academic credits for it. The course will exempt them from taking the obligatory Humanities course that is a requirement for all students at the college.

It is the sole responsibility of each student to affirm and verify the accumulation of the sufficient amount of required academic credits to complete their obligations and receive their degree

We will be happy to see you among our students in the coming year.

The Department of Animal Science – Three-year General Degree Course

First Year – Semester I

Course title	Course number	Credit points	Lecture hours	Tutorial hours	Lab hours	Total hours	Prerequisites
Philosophy of Science and Bioethics	5700003	1	1	0	0	1	
Cell Biology	1011221	3.5	3	1	0	4	
Invertebrate Zoology	5100000	2.5	2	0	1	3	Parallel with the Introduction of Statistics
Differential and Integral Math for Life Sciences	1011108	3	2	2	0	4	Remedial classes provided
General and Inorganic Chemistry	1011301	6	5	2	0	7	
Introduction to Differential and Integral Math	1000001	0	2	2	0	4	Exemption: 5 units (grade 80) or passing an exemption exam
Laboratory in Cell Biology	1011201	0.5	0	0	1	1	
Introduction to Statistics	1011300	2	1	2	0	3	
Introduction to Ecology	5211004	2.5	2	1	0	3	
English	9011104						
Total		**21**	**18**	**10**	**2**	**30**	

First Year – Semester II

Course title	**Course number**	**Credit points**	**Lecture hours**	**Tutorial hours**	**Lab hours**	**Total hours**	**Prerequisites**
Animal Embryology	5200000	3	2	0	2	4	Cell Biology, Invertebrate Zoology, Vertebrate Zoology (Parallel)
Botany	1021204	3	3	0	0	3	Cell Biology
Animal Histology	5211002	2	1	0	2	3	Cell Biology
Fauna of Israel	5300000	1.5	1	0	1 field trip	2	
Vertebrate Zoology	5110000	3.5	2	0	3	5	Invertebrate Zoology, Introduction to Statistics

Course title	Course number	Credit points	Lecture hours	Tutorial hours	Lab hours	Total hours	Prerequisites
Differential and Integral Math 2 for Life Sciences	1012125	3	2	2	0	4	Differential and Integral Math 1 for Life Sciences
Organic Chemistry	2039947	5	4	2	0	6	General and Inorganic Chemistry
Laboratory in General and Inorganic Chemistry	1013302	0.5	0	0	1	1	General and Inorganic Chemistry, Introduction to Statistics
English	9011104						
Total		**21.5**	**15**	**4**	**9**	**28**	

Second Year – Semester I

Course title	Course number	Credit points	Lecture hours	Tutorial hours	Lab hours	Total hours	Prerequisites
Computational Biochemistry 1	1021306	2.5	2	1	0	3	Organic Chemistry, parallel to Theoretical Biochemistry 1
Theoretical Biochemistry 1	1021304	2	2	0	0	2	Cell Biology, Organic Chemistry
Biostatistics	1021108	4	3	2	0	5	Differential and Integral Math 1 for Life Sciences
Genetics	1021205	4	3	2	0	5	Cell Biology, Organic Chemistry
Animal Nutrition (A)	5400000	3.5	3	0	1	4	Vertebrate Zoology, Organic Chemistry
Laboratory in Organic Chemistry	1021302	0.5	0	0	1	1	Organic Chemistry, Introduction to Statistics
Laboratory in Physics for Biotechnology	1011203	0.5	0	0	1	1	Introduction to Statistics
Introduction to Physics 1	1000018	0	1	0	0	1	Exemption: 5 units (80)
Physics 1	1000010	2	1.5	1	0	2.5	Remedial classes provided
Animal Physiology	5500002	2.5	2	0	1	3	Vertebrate Zoology, Embryology, Histology
Elective		**2**	**2**	**0**	**0**	**2**	
Total		**23.5**	**19.5**	**6**	**4**	**29.5**	

Second Year – Semester II

Course title	Course number	Credit points	Lecture hours	Tutorial hours	Lab hours	Total hours	Prerequisites
Veterinary Immunology	5750000	3.5	3	0	1	4	Theoretical Biochemistry 1, Comparative Animal Physiology
Biochemistry 2 Theoretical	1022306	2	2	0	0	2	Theoretical Biochemistry 1
Molecular Genetics	1022207	2	2	0	0	2	Genetics, Theoretical Biochemistry 1
Animal Nutrition (B)	5400000	3	2	1	1	4	
Biochemistry Lab 2	1022315	1	0	0	2	2	Biochemistry 1 and Biochemistry 2 courses (Parallel)
First Seminar in animal science	5953802	2	2	0	0	2	Cell Biology, Invertebrate Zoology, and Vertebrate Zoology
Comparative Animal Physiology	5953598	5	4	0	2	6	Animal Physiology
Physics 2 for Biotechnology	1012104	4	3	2	0	5	Physics 1
Physics 2 for Biotechnology Lab	1012108	0.5	0	0	1	1	Physics 1
Electives		**6**	**6**	**0**	**0**	**6**	
Total		**29**	**24**	**3**	**7**	**34**	

Third Year – Semester I

Course title	Course number	Credit points	Lecture hours	Tutorial hours	Lab hours	Total hours	Prerequisites
Behavioral Ecology	5951701	3	3	0	1 Field trip	4	
Fish in aquaculture and as a research model	5953950	3.5	3	0	1 Field trip	4	Vertebrate Zoology
Advanced Scientific Writing	5953903	2	2	2	0	4	Seminar 1 and completion of English exempt requirements
Introduction to Animal Endocrinology	5760000	2	2	0	0	2	Cell Biology, Vertebrate Zoology, Animal Physiology
General Microbiology	1021221	3	3	0	0	3	Cell Biology, Organic Chemistry
General Microbiology Lab	1021211	1	0	0	2	2	Cell Biology, Organic Chemistry, parallel to General Microbiology
Basic Pathology	5953700	3.5	3	0	1	4	Theoretical Biochemistry,

Course title	Course number	Credit points	Lecture hours	Tutorial hours	Lab hours	Total hours	Prerequisites
							Microbiology, Animal Physiology, and Comparative Animal Physiology
Electives		**8**	**8**	**0**	**0**	**8**	
Total		**26**	**24**	**2**	**5**	**31**	

Third Year – Semester II

Course title	Course number	Credit points	Lecture hours	Tutorial hours	Lab hours	Total hours	Prerequisites
Genetic Breeding of Animals	5600000	2	2	0	0	2	Genetics
Vertebrate Reproduction	5953500	2	2	0	0	2	Introduction to Animal Endocrinology
Experimental Design	1032214	1	0	2	0	2	Biostatistics (parallel)
Electives		**12**	**12**	**0**	**0**	**12**	
Social Sciences & Humanities Elective		**2**	**2**	**0**	**0**	**2**	
Total		**19**	**18**	**2**	**0**	**20**	
All three years		**140**	**118.5**	**27**	**27**	**172.5**	

The department may, at any time, institute changes in the curriculum and inform the students accordingly.

Department of Animal Science - Three-year Animal Health Track

The Animal Health Track is a 140-point curriculum which consists of:

A. All compulsory courses for the Degree in Animal Science.

B. Compulsory courses of the track: Veterinary Anatomy - Basics, Topographic Veterinary Anatomy, and Introduction to Pharmacology and Pathophysiology or Major Diseases in Dogs and Cats.

C. A selection of at least one course from each of our three areas of specialization; Animal pathogens, Livestock husbandry, and Wild animal Conservation and Reintroduction.

D. Selection of courses from a variety of elective courses from the Department of Animal Science.

First Year – Semester I

Course title	Course number	Credit points	Lecture hours[1]	Tutorial hours[2]	Lab hours[3]	Total hours	Prerequisites
Philosophy of Science and Bioethics	5700003	1	1	0	0	1	
Cell Biology	1011221	3.5	3	1	0	4	
Invertebrate Zoology	5100000	2.5	2	0	1	3	Parallel with the introduction of statistics
Differential and Integral Math for Life Sciences	1011108	3	2	2	0	4	Remedial classes provided
General and Inorganic Chemistry	1011301	6	5	2	0	7	
Introduction to Differential and Integral Math	1000001	0	2	2	0	4	Exemption: 5 units (grade 80) or passing an exemption exam
Laboratory in Cell Biology	1011201	0.5	0	0	1	1	
Introduction to Statistics	1011300	2	1	2	0	3	
Introduction to Ecology	5211004	2.5	2	1	0	3	
English	9011104						
Total		**21**	**18**	**10**	**2**	**30**	

First Year – Semester II

Course title	Course number	Credit points	Lecture hours	Tutorial hours	Lab hours	Total hours	Prerequisites
Animal Embryology	5200000	3	2	0	2	4	Cell Biology, Invertebrate Zoology, Vertebrate Zoology (Parallel)
Botany	1021204	3	3	0	0	3	Cell Biology
Animal Histology	5211002	2	1	0	2	3	Cell Biology
Fauna of Israel	5300000	1.5	1	0	1 field trip	2	
Vertebrate Zoology	5110000	3.5	2	0	3	5	Invertebrate Zoology, Introduction to Statistics
Differential and Integral Math 2 for Life Sciences	1012125	3	2	2	0	4	Differential and Integral Math 1 for Life Sciences
Organic Chemistry	2039947	5	4	2	0	6	General and Inorganic Chemistry

[1] Lecture Hours
[2] Tutorial Hours
[3] Laboratory Hours

Course title	Course number	Credit points	Lecture hours	Tutorial hours	Lab hours	Total hours	Prerequisites
Laboratory in General and Inorganic Chemistry	1013302	0.5	0	0	1	1	General and Inorganic Chemistry, Introduction to Statistics
English	9011104						
Total		**21.5**	**15**	**4**	**9**	**28**	

Second Year – Semester I

Course title	Course number	Credit points	Lecture hours	Tutorial hours	Lab hours	Total hours	Prerequisites
Computational Biochemistry 1	1021306	2.5	2	1	0	3	Organic Chemistry, parallel to Theoretical Biochemistry 1
Theoretical Biochemistry 1	1021304	2	2	0	0	2	Cell Biology, Organic Chemistry
Biostatistics	1021108	4	3	2	0	5	Differential and Integral Math 1 for Life Sciences
Genetics	1021205	4	3	2	0	5	Cell Biology, Organic Chemistry
Animal Nutrition (A)	5400000	3.5	3	0	1	4	Vertebrate Zoology, Organic Chemistry
Laboratory in Organic Chemistry	1021302	0.5	0	0	1	1	Organic Chemistry, Introduction to Statistics
Laboratory in Physics for Biotechnology	1011203	0.5	0	0	1	1	Introduction to Statistics
Introduction to Physics 1	1000018	0	1	0	0	1	Exemption: 5 units (80)
Physics 1	1000010	2	1.5	1	0	2.5	Remedial classes provided
Animal Physiology	5500002	2.5	2	0	1	3	Vertebrate Zoology, Embryology, Histology
Basic Veterinary Anatomy	5951503	4.5	2.5	0	4	6.5	
Elective (track or degree courses)		**0**	**0**	**0**	**0**	**0**	
Total		**26**	**20**	**6**	**8**	**34**	

Second Year – Semester II

Course title	Course number	Credit points	Lecture hours	Tutorial hours	Lab hours	Total hours	Prerequisites
Veterinary Immunology	5750000	3.5	3	0	1	4	Theoretical Biochemistry 1, Comparative Animal Physiology

Course title	Course number	Credit points	Lecture hours	Tutorial hours	Lab hours	Total hours	Prerequisites
Biochemistry 2 Theoretical	1022306	2	2	0	0	2	Theoretical Biochemistry 1
Molecular Genetics	1022207	2	2	0	0	2	Genetics, Theoretical Biochemistry 1
Animal Nutrition (B)	5400000	3	2	1	1	4	
Biochemistry Lab 2	1022315	1	0	0	2	2	Biochemistry 1 and Biochemistry 2 courses (Parallel)
First Seminar in animal science	5953802	2	2	0	0	2	Cell Biology, Invertebrate Zoology, and Vertebrate Zoology
Comparative Animal Physiology	5953598	5	4	0	2	6	Animal Physiology
Physics 2 for Biotechnology	1012104	4	3	2	0	5	Physics 1
Physics 2 for Biotechnology Lab	1012108	0.5	0	0	1	1	Physics 1
Elective (track or degree courses)		**3.5**	**3.5**	**0**	**0**	**3.5**	
Total		**26.5**	**21.5**	**3**	**7**	**31.5**	

Third Year – Semester I

Course title	Course number	Credit points	Lecture hours	Tutorial hours	Lab hours	Total hours	Prerequisites
Behavioral Ecology	5951701	3	3	0	1 Field trip	4	
Fish in aquaculture and as a research model	5953950	3.5	3	0	1 Field trip	4	Vertebrate Zoology
Advanced Scientific Writing	5953903	2	2	2	0	4	Seminar 1 and completion of English exempt requirements
Introduction to Animal Endocrinology	5760000	2	2	0	0	2	Cell Biology, Vertebrate Zoology, Animal Physiology
General Microbiology	1021221	3	3	0	0	3	Cell Biology, Organic Chemistry
General Microbiology Lab	1021211	1	0	0	2	2	Cell Biology, Organic Chemistry, parallel to General Microbiology
Basic Pathology	5953700	3.5	3	0	1	4	Theoretical Biochemistry, Microbiology, Animal Physiology, and

Course title	Course number	Credit points	Lecture hours	Tutorial hours	Lab hours	Total hours	Prerequisites
							Comparative Animal Physiology
Topographic Veterinary Anatomy	5951504	2	1.5	0	1	2.5	Vertebrate Zoology, Histology, Veterinary Anatomy
Introduction to Pharmacology	1600008	2	2	0	0	2	
Elective (track or degree courses)		**3**	**3**	**0**	**0**	**3**	
Total		**25**	**22.5**	**2**	**6**	**30.5**	

Third Year – Semester II

Course title	Course number	Credit points	Lecture hours	Tutorial hours	Lab hours	Total hours	Prerequisites
Genetic Breeding of Animals	5600000	2	2	0	0	2	Genetics
Vertebrate Reproduction	5953500	2	2	0	0	2	Introduction to Animal Endocrinology
Experimental Design	1032214	1	0	2	0	2	Biostatistics (parallel)
Pathophysiology **or** Major diseases in dogs and cats (Courses will be given intermittently - once every two years)	5951650 5921000	3.5	3	0	1	4	Comparative Physiology of Animals (parallel)
Electives		**9.5**	**9.5**	**0**	**0**	**9.5**	
Social Sciences & Humanities Elective		**2**	**2**	**0**	**0**	**2**	
Total		**20**	**18.5**	**2**	**1**	**21.5**	
All three years		**140**	**115.5**	**27**	**33**	**175.5**	

Animal Health Courses

In order to complete the conditions of the Animal Health Track, it is necessary to choose at least one course from each of the three subject areas

Courses offered relating to animal pathogens

Course title	Course number	Credit points	Lecture hours	Tutorial hours	Lab hours	Total hours	Year	Semester	Prerequisites
Parasitology[4]	5951202	2.5	2	0	1	3	2nd or 3rd	2nd	Invertebrate Zoology, Introduction to Ecology
Microbiome in Health and Illness	5953402	2	2	0	0	2	3rd	2nd	TBC
Virology	1022216	2.5	2	0	1	3	3rd	2nd	Biology Immunology

Courses offered relating to livestock husbandry

Course title	Course number	Credit points	Lecture hours	Tutorial hours	Lab hours	Total hours	Year	Semester	Prerequisites
Beef Cattle husbandry in natural and intensive systems[5]	5952912	3.5	2	0	2	4	2nd or 3rd	2nd	
Small Ruminants husbandry	5952699	3.5	3	0	1	4	2nd or 3rd	2nd	
Introduction to Entomology and insect rearing[6]	5952900	3.5[7]	2.5	0	2	4.5	2nd or 3rd	2nd	Invertebrate Zoology
Use of animal models for disease research	5953403	3.5	3	0	1	4	3rd	2nd	Vertebrate Zoology, Physiology of Biology, Biostatistics

Courses offered relating to species conservation and reintroduction

Course title	Course number	Credit points	Lecture hours	Tutorial hours	Lab hours	Total hours	Year	Semester	Prerequisites
Wildlife Management[8]	5953300	2.5	2	1	0	3	2nd or 3rd	2nd	Introduction to Ecology

[4] The Parasitology and Microbiome Courses in Health and Illness will not be given in the same year but will be given alternately - once every two years

[5] Cattle breeding husbandry in natural and intensive systems and small ruminant husbandry will not be given in the same year but will be given intermittently - once every two years

[6] Introduction to Insect rearing and entomology and the use of animal disease research models will not be given in the same year but will be given intermittently - once every two years

[7] Credits awarded for the course as from the 2021-2022 academic year.

[8] Course will be given once every two years

Course title	Course number	Credit points	Lecture hours	Tutorial hours	Lab hours	Total hours	Year	Semester	Prerequisites
Species Conservation and reintroduction[9]	5953404	2.5	2.5	0	0	2.5	2nd or 3rd	1st	TBC
Wildlife management and welfare in captivity	5953199	2.5[10]	1.5	0	2	3	2nd or 3rd	2nd	Vertebrate Zoology, Introduction to Ecology

The department may, at any time, make changes to the curriculum and inform the students accordingly.

A Multi-Year List of Animal Health Track and Elective Courses

To achieve their degree, students must ensure that they accumulate 140 academic credits from the combination of both elective courses and compulsory courses.[11] Not every elective course is offered each year, and it is advised to consider this when planning your study program. Each student may choose any of the elective courses provided that the prerequisites of that course are met.

Some elective courses are compulsory courses in Animal Health. The opening of the courses is conditional on the number of registrants, and they will not be held every year.

Course title	Course number	Credit points	Lecture hours	Tutorial hours	Lab hours	Total hours	In the annual listing
Basic veterinary anatomy	5951503	4.5	2.5	0	4	6.5	+
Topographic Veterinary anatomy	5951504	2	1.5	1	0	2.5	
Quantitative ecology of populations and communities	1232010	2.5	2	1	0	3	+
Computational by Biochemistry 2	1022307	1	0.5	1	0	1.5	+
Biology of laboratory animal	5951300	3	2	0	2	4	
Animal domestication	5952200	2	2	0	0	2	+

[9] Species Conservation and reintroduction and Wildlife management and welfare in captivity will not be given in the same year but will be given intermittently - once every two years

[10] Credits awarded for the course as from the 2021-2022 academic year.

[11] The opening of an elective is conditional upon the enrollment of 20 students and according to the annual curriculum

Beef Cattle husbandry in naturals and intensive systems	5952912	3.5	2	0	2	4	
Small Ruminants husbandry	5952699	3.5	3	0	1	4	
Laboratory in Molecular Genetics	1022208	1.5	0	0	3	3	+
Topics in Food Science and Biotechnology of Animals	5952910	3	2	0	2	4	
Introduction to Entomology and Insect Rearing	5952900	3[12]	2	0	2	4	
Animal Behavior	1222002	3	3	0	0	3	+
Species conservation and reintroduction	5953404	2.5	2.5	0	0	2.5	
Practical Experiment with Animals	5951755	3	1	0	4	5	+
Virology	1022216	2.5	2	0	1	3	+
Amphibians and Reptiles biology and husbandry	5953100	3.5	3	0	1	4	+
Introduction to Entomology	1400118	2	2	0	0	2	+
Introduction to Bioinformatics	1032777	2.5	2	1	0	3	+
Introduction to Geographical Information Systems (GIS)	1032400	2	1	2	0	3	+
Introduction to pharmacology	1600008	2	2	0	0	2	+
Use of animal models for disease research	5953403	3.5	3	0	1	4	
Main diseases of dogs and cats	5921000	3.5	3	0	1	4	
Microbiome in Health and Illness	5953402	2	2	0	0	2	
Wildlife management	5953300	2.5	2	1	0	3	
Poultry management	5952100	4.5	3	0	3	6	
Management of Nature Reserves and Landscapes	1032805	3	2	0	2	4	+

[12] The credits awarded for the course as from the 2021-2022 academic year will be 3.5 credits

Ecology Field-Based Laboratory	5951753	1	0	0	2	2	
Wildlife management and welfare in captivity	5953199	2[13]	1	0	2	3	
Agriculture and Environment	1223005	2	2	0	0	2	+
Avian Biology	5951757	3	2	0	2	4	+
Signal Processing in Ecology	5951705	3	2	0	2	4	
Research project - animal science	5952302	5	0	0	10	0	+
Parasitology	5951202	2.5	2	0	1	3	+
Primatology	5953399	3	2.5	1	0	3.5	+
Pathophysiology	5951650	2.5[14]	2	0	1	3	+
Research and Diagnostic methods in Veterinarian	4020035	2	2	0	0	2	
Applied Laboratory Medicine	5951764	2.5	2	0	1	3	
Biological clocks and their metabolic aspects	5951759	2	2	0	0	2	
Animal Cell Culture	1032511	1.5	1	0	1	2	+

All-Faculty Courses

Elective course title	Course number	Credit points	Lecture hours	Tutorial hours	Lab hours	Total hours	Prerequisites
Introduction to programing (R)	1030700	2	0	0	4	4	
In favor of Myself – Training the trainer supervision	3022067	2	0	0	0	2	Online course

Detailed Short Syllabi

Key: 1 Yearly Hour Lecture = 2 Academic Credits, 1 Tutorial/Laboratory Yearly Hour = 1 Academic Credit

Compulsory Courses

Veterinary Immunology Prof. Jacob Pitcovski

2nd yr. /2nd semester 5750000- 3.5 Academic Credits

3 Hour Semester Lecture + 1 Hour Semester Lab

[13] The credits awarded for the course as from the 2021-2022 academic year will be 3.5 credits.
[14] The credits awarded for the course will be 2.5 credits in the 2020-2021 and as from the 2021-2022 academic year will be 3.5 credits.

Specific and non-specific immunization, lymphocytic cells and tissues, antibody structure & properties, cells and receptors involved in immunological activity, immune response control, response to various antigens (molecules, viruses, bacteria); active & passive immunization, immunological tolerance, hypersensitivity, graft rejection, monoclonal antibodies, immunological methods for identifying an antigen and determining its antibody level.

Animal Embryology Dr. Smadar Tal

1st yr. /2nd semester 5200000 - 3.0 Academic Credits

2 Hour Semester Lecture + 2 Hour Semester Lab

The course objective is understanding of basic processes in embryonic development. It focuses on the various stages of embryonic development in domesticated animals – particularly mammals. Subjects include fertilization, stages of embryonic development, from the zygote to the early stages of embryonic development, evolution of body forms, development of the cardiovascular system, the bronchial and respiratory systems, the nervous system, musculoskeletal system, urogenital system, and physiology of embryonic tissues and placentas. The course includes lab hours to illustrate the processes of embryonic development.

Behavioral Ecology Dr, Yoni Vortman

3rd yr. /1st semester 5951701 – 3.0 Academic Credits

2 Hour Semester Lecture + 1 Hour Tutorial Session+ 1 Field Trip

How evolution shaped animal behavior. During the course, we will examine the central topics currently under study in the field of behavioral ecology. We will discuss how evolution shaped the foraging theory among animals, their learning ability, spousal selection processes, social behavior and learning, mutual aid and resource preservation. We will examine the contemporary studies that examine these issues and discuss the gaps that exist today in this field. Finally, the students will present an overview of a paper dealing in the field and suggest research questions that can be examined using animals that exist in the Hula Valley area.

Botany Prof. Rachel Amir

1st yr. /2nd semester 1021204- 3.0 Academic Credits

3 Hour Semester Lecture

The course will highlight the differences concerning the structure of Angiospermae organs and their functions: Organs that we will study include the root, stem, trunk, leaf, fruit, and seed. Furthermore, we will also study chapters from the angiosperms' physiology; these include water potential in plants, its components and

significance, photosynthesis – reactions to light and darkness, plant hormones, and photomorphogenesis.

Computational Biochemistry 1 Dr. Doron Goldberg

2nd yr. /1st semester 1021306 - 2.5 Academic Credits

2 Hour Semester Lecture + 1 Hour Tutorial Session

Principles of chromatography separation: Chromatography methods, gel filtration, ion exchange, electrophoreses gel, chromatogram. The chemical and physical properties of amino acids: Titration curves, isoelectric point, and the Henderson-Hasselbalch equation. The secondary structure of proteins: □ coil and □ pleated shell. Linking small molecules to proteins: microscopic and macroscopic dissociation constants, partial saturation, Adair equation, and dequilibrium dialysis. Allosteric effects: Co-operative link, positive and negative co-operation, Hill coefficient and Monod model for co-operative linking. The enzymatic catalysis: various enzymes, enzymatic action mechanism, enzyme structure, active site, initial velocity, the Michaelis-Menten model and equation, steady state model, Michaelis constant, and cyclical number. Linearization methods of the Michaelis-Menten equation: Eisenthal-Comish-Bowden, Eadie-Hofstee, Hans-Woolf, Lineweaver-Burk. Reversible enzymatic inhibition: Competitive inhibition and non-competitive inhibition. Identifying the type of inhibitor according to the Michaelis-Menten Equation graph.

Theoretical Biochemistry 1 Dr. Itamar Yedid

2nd yr. / 1st semester 1021304 - 2.0 Academic Credits

2 Hour Semester Lecture

The course offers an introduction to amino acids and proteins, the primary, secondary, tertiary and quaternary structure of the protein, hemoglobin as a model of an allosteric protein and antibodies. Lipids, fatty acids, simple and complex fats. Triglycerides, phospholipids, the structure and function of biological membranes. The structure of carbohydrates, monosaccharides, polysaccharides and their biological functions. Enzymatic decomposition in the digestive system, glycolipids, glycoproteins, lipopolysaccharides. Introduction to vitamins, hormones, their activities and functions, and growth factors.

Theoretical Biochemistry 2 Prof. Soliman Khatib

2nd yr. /2nd semester 1022306 - 2.0 Academic Credits

2 Hour Semester Lecture

Introduction to Metabolism: The kinetics and thermodynamics of biochemical reactions in the cell; the structure and function of energy-enriched molecules; glycolysis, starch and glycogen metabolism; citric acid and

glyoxylate cycles; phosphophantosis pathways; gluconeogenesis; catabolism and anabolism of lipids; ketone bodies; amino acid catabolism pathways; the urea cycle and metabolism under various conditions of nutrition.

Cell Biology Prof. Rachel Amir, Dr. Itamar Yedid

1st yr. /1st semester 1011221 - 3.5 Academic Credits

3 Hour Semester Lecture + 1 Hour Tutorial Session

Emphasis will be placed on the connection between the organelle's activity and its structure. Students will learn about the function and structure of the cellular membrane, mechanisms of conduction through the membranes, cellular signal transmissions, water balance and electrolytes in the cell, the internal membrane system (the endoplasmic retina, the nucleus shell, gulagic bodies, lysosomes, and plasmalemma [extracellular] space), intracellular skeletons and microtubules. Movement of lashes and spiders. The nucleus (chromatin structure, chromosomes, from DNA to protein, cellular lifecycle). Mitochondria, chloroplasts, palestides and plant cell walls.

Biostatistics Dr. Hagai Shemesh

3rd yr. / 1st semester 1021108 - 4.0 Academic Credits

3 Hour Semester Lecture + 2 Hour Tutorial Session

Descriptive statistics: Sample and population, types of variables, graphical presentation forms; center indices and scatter indices. Correlation between two variables, tables of collisions, diagrams of data on two quantitative variables, coefficient of correlation, linear regression and prediction. The normal distribution, standard score, boundary and central law, standard error. Introduction to Deduction: Statistical, parameter, the properties of estimates. Confidence intervals, hypothesis tests, significance tests, Z test for sample mean, errors in deduction, intensity, proportionate Z test for the difference between proportions, confidence interval and proportion, and a difference between proportions, test t and sample mean, for the average of independent and dependent samples; Test F for comparing variances of two samples, a chi-squared test, correlation and regression. Analysis of one-way variance test Tukey.

Fish in aquaculture and as a research model Dr. Dalia Niv

3rd yr. /1st semester 5953950 - 3.5 Academic Credits

3 Hour Semester Lecture + 1 Field Trip

The aim of this course is to introduce students to the world of aquaculture and its fundamentals, with an emphasis on the methods practiced in Israel. The course deals with the rearing methods employed in Israel and

around the world for edible freshwater and marine fish as well as the cultivation and breeding of ornamental fish. This includes the biology and breeding methods of freshwater, marine water and ornamental fish, sanitary practices in aquaculture, nutrition and reproductive biology, methods of artificial reproduction, and breeding of minnows. The course includes three laboratories dealing with biological and physiological aspects of fish and the water quality required for their breeding, as well as a daylong field trip.

Genetics Prof. Dany Bercovich

2nd yr. / 1st semester 1021205 - 4.0 Academic Credits

3 Hour Semester Lecture + 2 Hour Tutorial Session

Molecular Topics for Study: Genetic materials and its structure, DNA replication, transcription, translation and controls, the genetic code and amino acids, molecular processes - mutations, a selection of genetic illnesses in humans, the principles of genetic engineering, and molecular methodologies for genetic diagnoses.
Non-Molecular Topics: The lifecycle of the cell, meiosis and mitosis, Mendel's Laws of Segregation of a single and multiple genes, statistical analyzes of genetic models – chi-square, sex linkage, genetic models, quantitative heredity, genetic selection-cultivation, and heredity, determination of species in different organisms, recombination linkage and mapping of genes, chromosomal aberrations and population genetics.

Molecular Genetics Prof. Martin Goldway, Dr. Doron Goldberg, Prof. Dany Bercovich

2nd yr. /2nd semester 1022207 - 2.0 Academic Credits

2 Hour Semester Lecture

DNA properties, the structure of the Eukaryotic Genome, the DNA packaging in the nucleus of the eukaryotic promoter, transcription factors, the structure of the eukaryotic mRNA, axon introns, splicing, RNAi, development of the concept of inherited metabolic diseases, the perception of one gene and one enzyme, the perception of molecular diseases, the recombinant DNA revolution, the molecular basis of gene expression, gene expression control, mutations as a source of normal and genetic changes, genetic variation in humans, and the concept of polymorphism.

Animal Nutrition (A & B) Dr. Nader Mobarki

2nd year / 1st semester

2nd yr. /1st & 2nd semesters 5400000 - 6.5 Academic Credits

5 Hour Semester Lecture + 3 Hour Semester Lab

This is a general course, where students will acquire basic knowledge and understanding of the principles of

animal nutrition. The course offers an introduction into the animal digestive system, its structure and function. Subjects also include an introduction to the various nutritional components and their significance in the organism, understanding digestive processes and substance absorption at the organ and cellular levels, as well as the differences between the various animal groups and their detailed feeding plans according to specific needs and experience in constructing pertinent food portions.

Animal Histology Dr. Karen Jackson

1st yr. /2nd semester 5211002 - 2.0 Academic Credits

1 Hour Semester Lecture + 2 Hour Semester Lab

Students will study and become fully acquainted with the histological structure of various tissues in animals. Emphasis will be placed on the anatomic structure of the studied organs, the structure and organization of organs at the cellular level. Primary staining techniques used in preparation of animal tissues for light microscopy will be introduced.

Fauna of Israel Dr. Yoni Vortman

1st yr. /2nd semester 5300000 - 1.5 Academic Credits

1 Hour Semester Lecture + 1 Field Trip

An introduction to faunistics, the course deals with the geographic origins of various animals of the Land of Israel and their distribution throughout the country. It introduces first-year students to animals common to the region in their natural biogeographic and ecological habitat.

Invertebrate Zoology Dr. Itai Opatovski, Dr. Oren Pearlson

1st yr./ 1st semester 5100000 - 2.5 Academic Credits

2 Hour Semester Lecture + 1 Hour Semester Lab

The course is an introduction to the science of zoology. It emphasizes the effects of evolution on the organization, anatomy, and morphology of invertebrate animals and their adaptation to the environment. The course consists of a variety of frontal lectures and lab sessions. Biological innovations in each one of the systems will be emphasized,, and life cycles of select animals will be demonstrated. We will study a variety of sponges, corals and jellyfish, worms, arthropods, mollusks and tusks.

Vertebrate Zoology Dr. Roee Gutman, Dr. Oren Pearlson

1st yr. /2nd semester 5110000- 3.5 Academic Credits

2 Hour Semester Lecture + 3 Hour Semester Lab

This course provides students with a basic knowledge concerning vertebrates, an understanding of the connections between structure and function of various systems and their adaptation to their biosphere.

The course consists of a variety of lectures and lab sessions. The lectures will discuss topics pertaining to the unique characteristics of vertebrates, their evolution, ranking in the *phylum* Chordata [Chordates] and their evolutionary connection to invertebrate *phyla*. We will also discuss the evolution of various representative systems in the mature animal (skin, muscle, excretory, reproductive, nervous and sensory systems, skeletal and pulmonary systems, circulatory and internal secretion systems), and highlight the differences and distinct characteristics of the various taxonomic groupings.

During lab hours, representatives of each of the following vertebrates will be presented to the students: fish (cartilage, gram) amphibians, reptiles, birds, and mammals. Furthermore, details of various systems (skin, kidneys and the sensatory systems) will be presented and examined. Students will have the opportunity to dissect a representative of each of the five vertebrate phyla and study a number of defined systems.

Differential and Integral Math 1 for Life Sciences Dr. Solomon Vishkaustan, Dr. Anatoly Spivakovsky

1st yr. /1st semester 1011108 - 3.0 Academic Credits

2 Hour Semester Lecture + 2 Hour Tutorial Session

We will discuss the concept of Applied Function: its domain of definition, range, elementary functions and their graphs, blockages, parity, monotony, cyclicality of a function, operations on functions (sum, multiplication, counting, assembly, and inversion). Boundary of Function: definition, the arithmetic of boundaries, infinite borders and boundaries in infinity, one-sided borders, "unbounded" cases, and boundaries of elementary functions. ‘Sequentiality’: definition, unilateral continuity, classification of discontinuous points, the Intermediate Value and Weierstrass theorems. Derivative: calculation of the tangent gradient, definition of derivative, basic derivatives, shear rules, higher order derivatives, differential concept, ferma theorems, roll and Lagrange. Applications of the derivative in calculus: calculating limits using L'Hôpital's rule, extreme points, necessary and sufficient conditions for extremes, arrays and curves, function torsion points, asymptotics, function investigation and graph building, the Taylor formula, and basic Maclaurin polynomials.

Differential and Integral Math 2 for Life Sciences Dr. Solomon Vishkaustan, Dr. Anatoly Spivakovsky

1st yr. /2nd semester 1012125- 3.0 Academic Credits

2 Hour Semester Lecture + 2 Hour Tutorial Session

Indefinite integral: Early function, immediate integrals, methods of integration (variable substitution, integration

under parts, integration by decomposition, by integrating best practices assignments). Definite integral: The problem of computation of space, the definition of the definite integral by Riemann, properties of the definite integral, the definite integral as a function of the upper boundary, and the Newton-Leibniz formula. Applications of a definite integral in calculus: Surface calculations, rotational volume, linear arc length. The concept of the improper integral: Definition, types of improper integrals, and comparative test with integrals of positive functions. Multivariable Functions: Domain of definition, graph of function in two variables, cross-section and height lines, boundary, sequentiality, partial derivative, chain rule, extreme points, necessary and sufficient conditions for extremes, intentional derivative, gradient, extreme problems with constraints, and Lagrange multipliers. Differential Equations: Equations for the separation of variables, homogeneous equations and linear equations, etc. Applications: Radioactive decay, bacterial reproduction, heat transfer, co-existence of two species, plant growth, etc.

Genetic Breeding of Animals Prof. Dani Bercovich

3rd yr. /2nd semester 5600000- 2.0 Academic Credits

2 Hour Semester Lecture

The course introduces the use of genetic knowledge and research relevant to animal care in the human economy. Upon conclusion of the course, the student will be capable of proposing a plan for genetic conservation for domesticated or wild animal populations. Topics in the course include genetics in animal health and maintenance, a history of animal husbandry, a brief introduction to clinical genetics, population genetics, basic concepts in quantitative genetics, predicting values for cultivation, response to selection, application and conservation of resources for cultivation and designing a nurturing and cultivation program.

Organic Chemistry Prof. Soliman Khatib

1st yr. /2nd semester 2039947 – 5.0 Academic Credits

4 Hour Semester Lecture + 2 Hour Tutorial Session

Organic chemistry is a fundamental course for all life sciences, designed for students to learn the language of organic chemistry with an emphasis on understanding biological processes on the molecular event level. Topics covered in the course include the basics of organic chemistry in a comprehensive and insightful format – introduction, alkanes, cycloalkanes, alkylhalids, stereochemistry, nucleophilic substitution (SN1 and SN2), resonance, alcohols. alkenes, alkynes, ketones and aldehydes, carboxylic acids, amines and aminoacids, carbohydrates and aromatic chemistry (the chemistry of benzene).

General and Inorganic Chemistry Dr. Paula Pitsani, Dr. Andrea Shochman-Sapir, Dr. Livnat Journo

1st yr. /1st semester 1011301 - 6.0 Academic Credits

5 Hour Semester Lecture + 2 Hour Tutorial Session

A review of basic concepts, chemical and physical processes, compounds, mixtures, atoms, molecules and ions, atomic number, atomic weight, atomic structure, Avogadro number, Molecular concept, chemical formulas and equations, element sorting, periodic system, chemical bonding, reverse reactions and chemical equilibrium, solutions, concentrations, base acids, ionic equilibrium, common decompression effect, buffered solution, hard soluble salts, oxidation-reduction reactions, and thermochemistry. The course will further review the particle structure of material, quantitative calculations, gas laws, states of aggregation of materials, acids and bases, crystals, oxidation and redoxing, substance composition, concentrations and buffers. Laboratory: Experiments pertaining to general and inorganic chemistry as studied in the classroom: Substance composition, concentrations, chemical balance, acids and bases, buffer solutions, coordination complexes, oxidation and redoxing.

General & Inorganic Chemistry – Laboratory Dr. Livnat Journo

1styr. /2nd semester 1013302- 0.5 Academic Credits

1 Hour Semester Lab Session

The course includes an introduction to basic techniques, tools and instruments used in the chemistry lab, as well as the means and methods for experimental result analysis and reporting. Experiments include a tangible illustration of the theoretical materials studied in the course, substance preparation, separation methods, cleaning and identifying, qualitative and quantitative spectrophotometry, simple and potentiometric titrations, properties of ionic solutions, acidic and basic solutions, and buffer solutions.

Advanced Seminar Prof. Eran Dvir, Dr. Itai Opatovski

3rd yr. /1st semester 5953903 - 2.0 Academic Credits

2 Hour Semester Lecture

The aim of this seminar is to deepen and enhance the knowledge acquired in Seminar I by preparing an abstract overview on a research subject attained from reading seven innovative scientific papers and present the finished paper before the class.

Introduction to Animal Endocrinology Dr. Yonatan Foyerman

3rd yr. /1st semester 5760000 - 2.0 Academic Credits

2 Hour Semester Lecture

The course focuses on the hormonal control system of animals, from fish to mammals, with humans at the center of our study. We will study the body's endocrinological systems, the connection between the brain, the hypothalamus and the hypophysis. Different forms of secretion. Neurohypophysis and adenohypophysis hormones, adrenal hormones, thyroid hormones, and regulation of calcium metabolism. The hormones that control and monitor the reproduction system.

Introduction to Ecology Dr. Yoni Vortman & Dr. Oren Pearlson

1st yr. /1st semester 5211004- 2.5 Academic Credits

2 Hour Semester Lecture + 1 Hour Tutorial Session

The course introduces the ecosystem, habitats, limiting factors, tolerances, energy flow in an ecosystem, factors affecting the distribution of organisms, adaptation to different habitats, diversity of species, succession, regulation of population size, biotic and abiotic interactions in ecosystems, sorting and specialization, ecology and evolution, and biogeochemical cycles.

Introduction to Differential and Integral Math Dr. Solomon Vishkaustan, Dr. Anatoly Spivakovsky

1st yr. /1st semester 1000001- 0 Academic Credits

2 Hour Semester Lecture + 2 Hour Tutorial Session

The course reviews subjects such as polynomials, equations, inequalities, systems of algebraic equations and inequalities, polynomial divisions and decomposition. Square roots and logarithms. Solving equations, inequalities, systems of exponential and logarithmic equations and inequalities. Properties and graphs. Trigonometric functions and their graphs. Inverse trigonometric functions. The connection between degrees and radians. Full investigation of the function.

Introduction to Statistics Dr. Hagai Shemesh

1st yr. /1st semester 1011300 – 2.0 Academic Credits

1 Hour Semester Lecture + 2 Hour Tutorial Session

The aim of the course is to give students a basis in statistics and probability theory that will enable them to calculate basic statistics, build graphs and prepare them for advanced statistics courses. The course will cover the introductions of probability theory and descriptive statistics. The course will include basic concepts in probability and statistics such as: group theory, conditional probability, random variables, measurement scales, indices for central tendency and scatter and graph construction. Students who have completed the course will be

able to calculate basic statistical indices, construct graphs from a database and will have the background required to study statistical inference.

Introduction to Physics 1 Dr. Donita Cohen

2nd yr./1st semester 1000018 - 0 Academic Credits

1.5 Hour Semester Lecture + 1 Hour Tutorial Session

The course serves as a prerequisite to the course Physics 1. It is given during the first three weeks of the semester, after which students will take the Physics 1 course. The introductory course affords a foundation for physics and mechanical based thinking skills. A focus is placed on correct scientific notation, units, and the importance of experiments in building scientific theory. Furthermore, students will be exposed to the algebra of vectors and kinematics.

General Microbiology Prof. Segula Masaphy

2nd yr. /1st semester 1021221 - 3.0 Academic Credits

3 Hour Semester Lecture

The course looks at the essence of microbiology, the Protista Kingdom, and various methods for studying microbiology – the range of microscopes and staining methods. We will study the size of the various bacteria, the surface to volume ratio and their shape. The structure of the prokaryotic cell; the cell wall, the membrane, pili, capsule, chromosome, ribosome, gas blisters, and thylakoids. Chemotaxis movement, the cellular life cycle: Growth and control, generation time, various methods for measuring population size. A population's life cycle and continuing culture. Bacteria dimension control methods; physical and chemical methods, disinfectants and antiseptics. Antibiotics. Microbiology, food and its preservation. Nutrition - the microbe's chemical composition, the composition of the food substrate, selective and differential substrate enhancement, environmental conditions and their effect on growth, genetics of the genotype-phenotype as well as positive and negative controls, operon, mutations and mutagenic substances. Recombination in bacteria, conjugation, transduction and transformation. Bacteria as disease factors, systematics.

General Microbiology Lab Prof. Martin Goldway

2nd yr. /1st semester 1021211 - 1.0 Academic Credits

2 Hour Semester Lab Session

an introduction to various growth media and their sterilization, the sources of bacteria in our immediate environment, streaking and spreading [plating]. Bacteria morphology, Gram staining, bacterial growth

inhibition through use of antibiotics, characterizing bacteria according to their sensitivity to antibiotics and determining the minimal concentration as an inhibiting factor. Bacterial growth curves and the effect of various factors on growth rates. Recognition of mutagenesis, isolation of mutants, complementation of diploid mutations, and direct counting of yeast. Genetic control on galactosidase induction, studying the mechanism of genetic administration and control on this mechanism by means of operon mutants in lactose. Viruses – the Phage life cycle – transition from a lysogenetic to a lytic life cycle in a temperature sensitive phage mutation with a diffuser.

Biochemistry Lab 2 Dr. Doron Goldberg

2nd yr. /2nd semester 1022315- 1.0 Academic Credits

2 Hour Semester Lab Session

Typical reactions of amino acids, reducing sugars, unsaturated fatty acids, protein precipitation by means of salting out and acids, titration of amino acids, finding the isoelectric point of protein, the electrophoresis of proteins in polyacrylamide gel (SDS-PAGE), kinetics of enzymatic reaction, finding the ligand binding to protein, and gel filtration.

Laboratory in Cell Biology Dr. Alon Margalit, Dr. Hadas Merom Weinstein

1st yr. /1st semester 1011201 - 0.5 Academic Credits

1 Hour Semester Lab Session

The course will focus on a microscopic study of the eukaryotic cell. It will be comprised of four 3-hour sessions that will focus on an introduction to working with a light microscope and staining methods, white blood cells and the defense mechanism, chromosome and karyotype structure as well as the cellular cycle.

Laboratory in Organic Chemistry Prof. Soliman Khatib

2nd yr. / 1st semester 1021302 - 0.5 Academic Credits

1 Hour Semester Lab Session

The lab includes the study and implementation of the primary laboratory techniques used in organic chemistry to produce substances (known or unknown to date) from given original materials or extract from plants, based on the knowledge acquired during the course. The experiments include executing responses, identifying functional groups, isolating and identifying from a qualitative and quantitative standpoint the various by-products. Special emphasis is placed on the methods used in isolating and cleaning final and intermediate products: Extraction, distillation, crystallization, thin layer and gas chromatography.

Laboratory in Physics for Biotechnology Dr. Yair Rezek

2nd yr. /1st semester 1011203 - 0.5 Academic Credits

1 Hour Semester Lab Session

In this course we will conduct several physics labs, analyze the gathered data and report them. We will experiment with physical phenomena learned in the Physics 1 course and see how they are realized in practice. We will also learn principles of the scientific method, with an emphasis on understanding the importance of measuring errors and their use. The course objectives are to illustrate fundamental phenomena in physics, develop skills of analyzing and reporting basic experiments in physics, and instill a critical approach to reading and analyzing experimental outcomes.

First Seminar in Animal Science Dr. Roee Gutman, Dr. Itai Opatovski

2nd yr. /2nd semester 5953802 - 2.0 Academic Credits

2 Hour Semester Lecture

The objective of the seminar is to teach students the ways and means to read and summarize scientific materials in research stages from the field of animal science. By the end of the course, students will be able to search for papers on a certain topic, study it by way of critical reading, and write an abstract, integrating a few current studies on the topic; they will then experience preparing a presentation and giving a short, comprehensive lecture on the topic.

Animal Physiology Dr. Talia Etzion

2nd yr./1st semester 5500002 - 2.5 Academic Credits

2 Hour Semester Lecture + 1 Hour Semester Lab

The course focuses on studying the physiology of the nervous and muscular system in humans and animals. Topics in the course include introductory physiology, an introduction to the nervous system, communications between neurons, the central nervous system, development of the nervous system in animals, the peripheral nervous system, sensory systems, and the muscular system.

Comparative Animal Physiology Dr. Roee Gutman

2nd yr./2nd semester 5953598 - 5.0 Academic Credits

4 Hour Semester Lecture + 2 Hour Semester Lab

This course provides knowledge on the physical, mechanical, and biochemical features of regulation

mechanisms of metabolism, body temperature, respiratory system, vascular circulatory system, and excretory system in animals and humans. Upon completion of the course, students will be able to depict and describe the structure, function, and connection between the above-mentioned elements in central physiological systems of vertebrates; to compare, demonstrate, and explain various physiological adaptations of animals to their habitats; and to explain various homeostasis mechanisms aimed to maintain a stable interior physical environment.

Physics 1 Dr. Donita Cohen

2nd yr. /1st semester 1000010 - 2.0 Academic Credits

1.5 Hour Semester Lecture + 1 Hour Tutorial Session

The course covers topics in mechanics with a focus on understanding physical systems and the processes that occur within them. Algebra is used to formulate physical laws and apply them to various physical systems. The course's topics include the basic laws of motion, Newton's laws, and the three conservation laws of mechanics. Tutorial sessions are designed to help students to apply and assimilate the materials studied in the classroom. The course is intended to equip students with scientific critical and developmental tools, which best materialize in the science of physics. Upon completion of this course, students will be able to describe motion in one and two dimensions, build free body force diagrams on bodies in different systems, and identify the relevant laws for every mechanical problem. Additionally, they will be able to analyze specific problems, and identify which conservation laws apply to each problem and how they can be used to solve it.

Physics 2 for Biotechnology Dr. Yair Rezek

2nd yr. /2nd semester 1012104 - 4.0 Academic Credits

3 Hour Semester Lecture + 2 Hour Tutorial Session

This course deals with describing and understanding physical phenomena in the fields of fluid mechanics, waves, electricity and magnetism, electromagnetic radiation and radioactivity, with an emphasis on subjects that students will need in their future studies of biotechnology and animal, food and environmental sciences. The course introduces students to basic concepts and phenomena in hydrodynamics and electromagnetism, focusing on how they are expressed in engineering, biology, environmental sciences, and medicine; it also provides students with a familiarity concerning the quantitative aspects of basic concepts and phenomena in the field. We will expand on issues pertaining to the physical world as a means of obtaining recognition and understanding of the application of Newton's equations to fluid systems, an understanding of electromagnetism, and an introduction to the area of quantum physics.

Physics 2 for Biotechnology Lab Dr. Yair Rezek

2nd yr. /2nd semester 1012108 - 0.5 Academic Credits

1 Hour Semester Lab Session

In this course we will conduct several physics labs, analyze the gathered data and report them. We will experiment with physical phenomena learned in the Physics 2 course and see how they are realized in practice. We will also learn principles of the scientific method, with an emphasis on understanding the importance of measuring errors and their use. The course objectives are to illustrate fundamental phenomena in physics in an experiential way, develop skills of analyzing and reporting basic experiments in physics, and instill a critical approach to reading and analyzing experimental outcomes.

Philosophy of Science and Bioethics Dr. Eli Pitcovski

2nd yr. /1st semester 5700003- 1.0 Academic Credits

1 Hour Semester Lecture

The course will deal with the philosophy and ethics of science. In the first context, we will discuss questions such as, "what makes a theory a scientific theory?", "what is a scientific explanation?" and "what validates the knowledge given to us by science?", as well as basic concepts such as hypothesis, refuting, context of discovery, and naturalistic failure. In the context of ethics, we will look at problems arising from experiments in animals, genetic engineering, and biotechnology.

General Pathology Prof. Eran Dvir

3rd yr. /1st semester 5953700 - 3.5 Academic Credits

3 Hour Semester Lecture + 1 Hour Weekly Lab

The purpose of this course is to provide basic knowledge on pathological processes such as cell injury and death, necrosis, inflammation and healing. The rest of the course will be devoted to fundamental pathological processes in the different body systems namely cardiovascular, respiratory, digestive, urinary, hematological and lymphatic, skin, reproductive, endocrine, nervous and skeletal systems. The course is focusing on diseases of small animals and diseases that are present in humans and animals based on the “One Health” discipline.

Vertebrate Reproduction Dr. Smadar Tal

3rd yr. /2nd semester 5953500- 2.0 Academic Credits

2 Hour Semester Lecture

The course discusses processes of the vertebrate reproductive systems, with an emphasis on mammals. Subjects include the structure and function of the reproductive systems in domestic animals, the endocrinology of the reproductive system, sexual maturity, reproductive cycles, reproductive behaviour, sexual conflicts, sex selection, the female reproductive system and the estrus cycle, the male reproductive system and its function, mating and pregnancy, care of the offspring, as well as new assisted reproductive technologies for treatment of fertility problems in animals.

Experimental Design Dr. Ofir Degani

3rd yr. /1st semester 1032214 - 1.0 Academic Credits

2 Hour Tutorial Session

The aim of this course is to provide students with an in-depth understanding and skills for planning experiments related to biotechnology and the environment, and the ability to examine research and results in a critical manner. The student will be exposed to considerations the researcher must deal with prior to conducting the experiment; in what cases should the results be statistically processed and how it affects the design of the experiment. The difference between observation and experiment, and the role of control in the experiment. The course will include the following topics: The scientific method, the controlled experiment, the steps in experimental design, selecting an appropriate statistical test, the essence of the measured variables and their influence on the experiment (quantitative and qualitative models, experiments in continuous and discrete variables in natural populations, experiments that measure ratio, experiments with multiple variables), the effect of sampling and the type of analysis on the results, and the role of the internal standard. The discussion in each of these subjects will involve analyzing and reviewing a variety of experiments contained in relevant scientific literature.

Animal Health Track and Elective Courses

Some elective courses are compulsory courses in Animal Health. Opening of the courses is conditional on the number of registrants and they will not be held every year.

Basic Veterinary Anatomy Dr. Smadar Tal

5951503 – 4.5 Academic Credits

2.5 Hour Semester Lecture + 4 Hour Tutorial Session

The course provides students with a fundamental understanding of mammalian anatomy from a veterinary point of view. It gives an overview of names and location of the various bones and muscles, the cardiovascular

system, internal organs of the digestive, urinary and reproductive systems, as well as the nerves and sensory organs in the animal's body. Our model animals are the dog, the goat, and the donkey. The course includes multiple lab sessions.

Topographic Veterinary Anatomy Dr Smadar Tal

5951504 – 2.0 Academic Credits

1.5 Hour Semester Lecture + 1 Hour Tutorial Session

The course aims to teach the specific position of anatomic structures and organs in domestic animals (e.g. bovine and canine), Comparative morphological analysis will provide the basis for studying the pathology, physiology, clinical diagnostics, animal breeding as well as meat hygiene. Presentation of the topographic structures of the thoracic and pelvic limb, the head, neck and trunk will be taught, and using stratigraphy, skeletotopy, holotopy, syntopy of the organs of the thoracic, abdominal and pelvic cavity of domestic animals. Palpation and determination anatomic structures in the following parts of the animal body: thoracic and pelvic limb, head, neck, dorsum, thoracic, abdominal and pelvic cavity. Anatomic locations of intravenous, subcutaneous, intramuscular and intraarticular injections, topography of the lymph nodes palpable during the clinical examination, as well as arteries, in which the heart rate is examined. At the end of the course the student knows the regions of the body, the stratigraphy, and in the splanchnic cavities, the topography and relationships of the organs and viscera contained. The student will be able to perform a dissection of the regions of head, neck, and trunk in different species of animal; identify organs and viscera contained in the three splanchnic cavities; identify the relationships between the structures contained in the cavities, with special relevance for those of clinical interest;follow the course of the major vessels and nerves in the regions of the head, neck, trunk and tail;comprehend anatomical content in the medical literature; use appropriately the anatomical terminology officially adopted; recognize whether a given anatomical structure is topographically in the right site or not.

Quantitative Ecology of Populations and Communities Dr. Hagai Shemesh

1232010 - 2.5 Academic Credits

2 Hour Semester Lecture + 1 Hour Tutorial Session

In this course, students will learn the ways and means of assessing animal population sizes according to methods presented by Patterson, Shnabel and Julie-Sever; we will study some 25 different mathematical models that describe that which is taking place in any single population and in a community (a collection of populations). We will learn how to use these models to resolve issues and problems being faced in animal ecology, including the preservation of diverse species. Students will also be required to cope independently

with complicated and more complex models extracted from contemporary scientific literature and present the model before the class.

Computational by Biochemistry 2 Dr. Doron Goldberg

1022307 - 1.0 Academic Credits

1 Hour Semester Lecture + 1 Hour Tutorial Session

The principles of cellular energy production: The change in free energy as an indicator of the direction of reactions in the cell, the standard change in free energy. Reduction-oxidation potential: Half-cell response, the standard hydrogen electrode; the glycolysis pathway; Fermentation processes, the energy balance of glycolysis. The citric acid circuit as an integrator of the metabolic processes in the cell: Entry and exit points from the circuit, the final oxidation of the fuel molecules, glycolysic acid pathway, fatty acid metabolism, β oxidation and the formation of ketone bodies in starvation situations. Electron Chain: The potential differences between the steps in the chain and its energy balance, the significance of coupling in the process of creating the ATP.

Biology of Laboratory Animal Prof. Eran Dvir

5951300 - 3.0 Academic Credits

2 Hour Semester Lecture + 2 Hour Weekly Lab

The aim of the course is to impart knowledge and training in the field of recognizing laboratory animals from a variety of different aspects, such as the history of the use of laboratory animals, their biology, genetics, maintenance equipment, and the advantages in research. Major diseases in rodents and rabbits, zoonoses and biological hazards, familiarity with the rules of ethics and the proper work procedures. A review will also be made of the effect of living and rearing conditions on laboratory animals.

Animal Domestication – TBC

5952200 - 2.0 Academic Credits

2 Hour Semester Lecture

Some 10,000 years ago, the animal domestication process began, with tremendous implications on humans and their environment and effects on a variety of biogeographic, epidemiologic, genetic, and social aspects. In this course, we will study the characteristics that differentiate domesticated animals from wild animals, and how these characteristics were acquired in the domestication process. Furthermore, we will discuss methods that are used to trace the domestication process with paleo-biological and genetic techniques, utilizing animal bones

from archaeological sites (archaeo-zoology). We will study the history of the primary domesticated species, including the goat, sheep, cattle, swine, and dog.

Beef Cattle husbandry in naturals and intensive systems Dr. Aviv Asher

5952912 – 3.5 Academic Credits

3 Hour Semester Lecture + 1 Hour Field Trip

The course provides students with basic and comprehensive knowledge of the beef cattle trade in Israel, particularly cattle breeding in the pastures of the Galilee and Golan Heights (natural environment breeding) and its continuance in intensive systems, i.e. fattening plants. Upon completion of the course, students will be able to describe the stages of breeding and the characteristics (structure and physiology) of cattle in grazing fields in Israel, interactions of the cattle with different habitats, grazing interfaces, social structure and physiology of the grazing herd, grazing behavior throughout the year and environmental influences, and health issues of the herd. The course will further focus on the various stages of the grazing field versus fattening plant breeding and the transfer from one to the other. Furthermore, students will recognize the difference between extensive breeding (in natural systems) and intensive breeding (fattening) and the connection between them. They will be able to plan and schedule initiated activities in the grazing field, such as adding supplementary food or bringing bulls for reproduction; determine appointed times for weaning, and plan fattening portions in an intensive interface, as well as economical calculations for the two breeding types. The course will utilize current studies and literature, and will include two professional field trips: one pertaining to natural breeding and managing natural systems (a visit to Karei Deshe research farm and to a commercial herd in a grazing field in the Galilee) and the other focusing on intensive breeding in a fattening plant (a visit to Neve Ya'ar research farm and to a commercial fattening plant). The field trips are designed to expand the theoretical as well as practical knowledge in the field.

Small Ruminants husbandry Dr. Tzach Aharon Glasser

5952699 - 3.5 Academic Credits

3 Hour Semester Lecture + 1 Field Trip

The course seeks to acquaint students with the local and global small ruminant industry, provide an understanding of the problems facing the small ruminant economy and the reciprocal relations between rearing small ruminant animals and the ecological system. Small ruminant breeding is a developing industry in Israel and throughout the world. The course will review the history of this important animal industry and its development. As part of the course, we will introduce various interface methods, from small herds to large-scale

commercial operations. Upon conclusion of the course, students will be familiar with small ruminant rearing operations in Israel and throughout the world, the development of various interfaces in the breeding field, small ruminant nutrition, nurturing, breeding and health, and will have knowledge about planning and designing unique feed plans and the means and methods being utilized in the industry today for economic calculations and general planning of herds.

Laboratory in Molecular Genetics Prof. Martin Goldway, Prof. Dani Bercovich, Dr. Doron Goldberg
1022208 - 1.5 Academic Credits
3 Hour Semester Lab Session
The course provides students with theoretical background and practical experience in basic methods in the field of molecular genetics. The lab work includes DNA-cutting by restriction enzymes, separation of DNA fragments in agarose gel, ligation, transformation of bacteria, extraction of plasmid and genomic DNA, PCR, DHPLC, and identification of genetic polymorphism in humans. Lab sessions include expanding lectures on key laboratory topics and central methods of DNA sequencing, DNA hybridizations, and RNA microarrays.

Topics in Food Science and Biotechnology of Animals Dr. Adi Jonas-Levi
5952910 - 3.0 Academic Credits
2 Hour Semester Lecture + 1 Hour Lab Session + 1 Field Trip
The course offers a deepening of the students' theoretical knowledge in animal feed science, while focusing on the pet and horse food industry, including a feeding experiment utilizing larvae as an animal model. Students will gain insight and experience concerning the technological methods employed for producing pet food, as well as technologies in the dairy industry. They will also be exposed to the pharmacological-biotechnological methods used in the production of food supplements, manufacturing and application of antibodies used in the quality assessment and cleanliness of today's food products.

Introduction to Entomology and Insect Rearing Dr. Itai Opatovski
5952900 - 3.0 Academic Credits
2.5 Hour Semester Lecture + 2 Hour Lab
The primary objective of this course is to provide more profound biological, ecological, and biotechnological knowledge concerning insects – the wealthiest animal taxon, and instruct in the methods used for rearing a number of species for various purposes: in service to agriculture (e.g. bees for pollination or insects for

biological pest control), as animal feed, as pets, or for educational purposes. The course combines lectures with lab sessions and fieldtrips.

Species conservation and reintroduction – TBC

5953404 – 2.5 Academic Credits

2.5 Hour Lecture

TBC

Animal Behavior Prof. Nurit Carmi

1222002- 3.0 Academic Credits

3 Hour Semester Lecture

The evolution of behavioral strategies: The Darwin Theory as a model for understanding animal behavior. Inherited behavioral characteristics as opposed to acquired ones, and the effect of genetic, neural, physiological, biochemical, and environmental factors on animal behavior. Communications in the animal world, the behavior of foragers and predators vis-a-vis their prey, behavioral patterns pertaining to the search for a habitat, territorialism, animal migration, sexual, parental, and social behavior. Intersexual and intrasexual interactions and animal societal models, cooperative development and the gaming theory. Human behavior: From sociobiology to sociology – aspects of human behavior evolution.

Practical Experiment with Animals Dr. Oren Pearlson

5951755 - 3.0 Academic Credits

1 Hour Semester Lecture + 4 Hour Lab Session

In this course, students will become acquainted with several areas of rearing, caring for, and curing animals. They will experience hands-on working with animals, which will contribute to their professional development and equip them with the professional experience needed to be hired at their first workplace after graduating. It will expose them to various niches in the field of animals and to different ethical issues that accompany it, thus help them to find an interesting position that would fit with their training. An important part of college life is community involvement; the experience during this course will allow students to engage more with communities related to animals: fellow professionals in the field, pet owners, and veterinarians of different kinds.

Virology Prof. Jacob Pitcovski

1022216 - 2.5 Academic Credits

2 Hour Semester Lecture + 1 Hour Lab

The course introduces students to a variety of viruses and their properties. This includes defining viruses, their general structure, division into groups, bacteriophages, animal and plant viruses, genetic reproduction of viruses, virus-cell interaction, cancer spreading viruses, methods for identifying and classifying viruses, reproduction methods of viruses for vaccine and research needs, and anti-viral medications.

Amphibians and Reptiles biology and husbandry Dr. Boaz Shacham

5953100 - 3.5 Academic Credits

3 Hour Semester Lecture + 1 Hour Lab

This course offers a biological and ecological introduction to reptiles and amphibians of the Mediterranean Sea region, focusing on Israel. It consists of a study and review of the problems faced by the six amphibian species residing in Israel, their southernmost border of dispersion. This covers their reproductive cycles, courtship behavior, and the metamorphosis of anuran and caudate amphibians; the difficulties associated with terrestrial movement of amphibians; factors affecting habitat fragmentation and population disjunction and the problems associated with these phenomena; and the methods and conditions employed in the captive husbandry of reptiles and amphibians in the laboratory and in zoological gardens.

Introduction to Entomology Dr. Itai Opatovski

1400013 - 2.0 Academic Credits

2 Hour Semester Lecture

The primary objective of this course is to provide a more profound level of knowledge surrounding insects, the world's wealthiest animal taxon. Topics studied in the course include the importance of entomology, insect taxonomy, insect morphology and physiology, communication in insects, the reciprocal relations between insects and plants from an agricultural point of view, and many other varied subjects.

Introduction to Bioinformatics Prof. Dani Bercovich

1032777 - 2.5 Academic Credits

2 Hour Semester Lecture + 1 Hour Tutorial Session

An introduction to bioinformatics; the human genome project; searching biological databases by basic texts (PubMed OMIM); searching databases to find DNA, mRNA, or protein sequences; analyzing DNA sequences to identify genes, their structure, and various motives; comparative methods of sequence pairs, comparing multiple sequences simultaneously, MSA and phylogenesis; translation programs from DNA to protein and vice

versa; identification and characterization of protein families and finding possible spatial structures; locating known changes in DNA and protein mutations and polymorphism; planning PCR alternatives; locating cutting places of restriction enzymes and building vectors.

Introduction to Geographical Informational Systems (GIS) Dr. Oren Reichmann

1032400 – 2.0 Academic Credits

1 Hour Semester Lecture + 2 Hour Tutorial Session

The course combines a theoretical part with exercises. The theoretical part will focus on the principles of GIS, namely, system structure, databases, projections, and coordinate systems, vector-based and raster-based data models, spatial analysis, map production, developmental directions and technology, GIS online, and data sources in Israel. The course will include examples of current uses of GIS. Exercises will focus on the practical aspect of layers, charts, Geoprocessing analyses, map production, etc., using the ArcGIS software.

Introduction to Pharmacology Dr. Shlomo Shapira

1600008- 2.0 Academic Credits

2 Hour Semester Lecture

Acquiring basic knowledge in Pharmacology

Chapters: Basic considerations in medicinal treatment, Modes of medicines administration, Basics of pharmacokinetics, Basics of pharmacodynamics, Principles of medicinal action on cellular and systematic levels, Basic principles of toxicology, Examples of medicinal treatment of various diseases.

Use of animal models for disease research Dr. Yonatan Foyerman

5953403– 3.5 Academic Credits

3 Hour Semester Lecture + 1 Tutorial

The course aims to provide students with the basic tools required to engage in applied research based on knowledge gained during their studies in the Department of Animal Science. During the course we will learn what the concept of applied research means, with an emphasis on the study and understanding of the common tools in preclinical and clinical research, in both veterinary and human medicine. We will also address ethical issues in animal science research and the implications of these issues on how to design and conduct applied animal research.

Main Diseases of Dogs and Cats Prof. Eran Dvir

5921000- 3.5 Academic Credits

3 Hour Semester Lecture + 1 Field Trip

Throughout the course, we will study the major canine and feline diseases, with an emphasis on those transmitted to humans (zoonoses) and those transmitted to wild animals. The various diseases will be studied according to the different bodily systems (e.g. illness of the digestive system, respiratory system, cardiovascular, kidneys and urinary tract, endocrinology and infectious diseases). In discussing infectious diseases, we will review the vaccines given to cats and dogs, as well as the preventive treatments given against parasites. Students will be given the opportunity to submit a seminar paper on a specific illness or syndrome as part of their final grade.

Microbiome in Health and Illness TBC

5953402 – 2.0 Academic Credits

2 Hours Semester Lecture

TBC

Wildlife Management Dr. Boaz Shacham

5953300 - 2.5 Academic Credits

2 Hour Semester Lecture + 1 Field Trip

The course concentrates on understanding the factors and processes that affect wildlife in their natural and fertile ecosystems. Students will gain insight into the correlation between the spatial conditions, existence and migration movements of animal populations. Special emphasis will be given to the place of wild animal populations within the sphere of open spaces and nature reserves. Students will complete a variety of exercises in which they will use quantitative analysis and seek out ways to understand the processes utilized in rehabilitating and managing animal populations.

Poultry Management Prof. Jacob Pitcovski

5952100 - 4.5 Academic Credits

3 Hour Semester Lecture + 3 Field Trips

This course introduces the poultry industry and primary aspects of their rearing. Students will learn about the industry here in Israel and across the globe, and its major branches of broilers, layers, and turkey. An emphasis will be placed on the unique characteristics of each branch, in terms of structures, equipment, and growth conditions. Further topics include poultry genetics, the means and methods employed in facilitating improved

genetic lines in broilers and layers; breeding and incubation, the breeding processes as executed in the various poultry branches. Students will study poultry physiology, i.e. the sexual, digestive, respiratory, nervous and vascular systems, skin and feathers, and the hormonal system. Poultry nutrition, the raw materials and additives used in feed production, nutritional requirements according to age and agricultural branch. The immune system. Illnesses related to the poultry industry, treatments, medications and vaccines. The chicken run and its equipment – the structure, feeding and drinking devices, etc. Students will review and discuss relevant issues that are unique to each of the industry's various branches, and tour various facilities for broilers and layers, breeding, incubators and feed facilities.

Management of Nature Reserves and Landscapes Dr. Yedidya Kaplan

1032805 - 3.0 Academic Credits

2 Hour Semester Lecture + 2 Field Trips

This course exposes students to the history and principles of nature conservation in Israel and around the world. They will be introduced to local and foreign entities engaged in this field. The course covers the development of nature conservation from an emotional and aesthetic foundation to a full-scale school of scientific thought. Topics include processes of extinction, fragmentation in natural systems, invasive species and the role of ecological corridors. The conservation of genetic diversity, species, populations and ecological systems. Students will study issues of conservation planning and the interface management of nature reserves, landscape and open spaces, while introduced to terms relevant to landscape ecology and biosphere reserves. Further subjects are the functional impairment of nature and the need for its interface, with an emphasis on its diverse levels, water problems, toxins, coexistence with agriculture, and visitor control. The interface of the values pertinent to nature and its conservation in Israel, with an emphasis on the preservation of Mediterranean and aquatic ecosystems, the preservation of species, population restoration and their return to nature.

Ecology Field-Based Laboratory Dr. Oren Pearlson

5951753 - 1.0 Academic Credits

2 Hour Lab Session

The objective of this course is to expand the knowledge surrounding the materials studied in the course "Introduction to Ecology", while working and applying its lessons in the field. The work will include practical experience in sampling various ecological parameters, while studying representative characteristics of different societies and populations in a variety of habitats that are typical to the region.

Wildlife management and welfare in captivity Dr. Rona Nadler Valenci

5953199 - 2.0 Academic Credits

1 Hour Semester Lecture + 2 Field Trips

The course will discuss the philosophy and history of zoos and educational petting zoos, the various laws that regulate holding animals in captivity, topics pertaining to animal behavior while in captivity, their maintenance and treatment. We will expand the discussion to include issues of the welfare of animals in captivity, their health maintenance, environmental enrichment, and the role-play by zoos today in the preservation and protection of animal species in danger of extinction.

Agriculture and Environment Dr. Liora Shaltiel-Harpaz

1223005 - 2.0 Academic Credits

2 Hour Semester Lecture

The objective of the course is to examine, based upon scientific research studies, how a balance can be attained between often-contrasting goals of agricultural, economic development and supplying society's needs on one hand, and preserving and nurturing environmental resources for the welfare and quality of life of humans on the other.

Avian Biology Dr. Yoni Vortman

5951757- 3.0 Academic Credits

2 Hour Semester Lecture + 2 Hour Lab

This course offers a profound insight into the wild bird population in Israel, its primary research topics and contemporary methods used in studying this field of science. We will study how to identify the various species from a variety of orders. Students will become acquainted with the principles of ringing and the use of this instrument as a research tool. Additional topics include different ways to monitor wild bird migration, and an examination of their physiology using various methods. We will discuss how to sample their associated parasites, take relevant blood and DNA samples. We will also study how to analyze Microsatellite DNA and its uses. Lastly, students will learn about the use of nuclear isotopes as tool for investigating migration routes. All this in light of Israel's unique location along the world's central migration route.

Signal Processing in Ecology Prof. Yizhar Lavner, Dr. Yoni Vortman

5951705 – 3.0 Academic Credits

2 Hour Semester Lecture + 2 Field Trips

Contemporary advanced ecological research requires ever-increasing signal processing capabilities. Field samples manufacture a unique digital database, and its analysis requires well-developed programming and analysis capabilities that provide challenging not only for ecologists, but also for those from the signal-processing field. Consequently, cooperation is consistently required between these two fields of research. In light of this, this course aims to impart to students of ecology a basic acquaintance with signal processing and the means necessary to cooperate with experts in the field. Additionally, we seek to provide those students studying signal processing an acquaintance with the various fields of animal science, a better understanding of the challenges that arise from ecological research and how to cooperate with ecologists. The course faculty includes researchers from both the signal processing and the ecology fields.

Research Project – Animal Science Dr. Liora Shaltiel-Harpaz

5952302 - 5.0 Academic Credits

10 Hour Semester Lab Sessions

The research project will be executed under the guidance of a scientist from any one of the specialties comprising animal and/or environmental sciences. The project will be conducted as an independent research study developed by the student in concert with researchers from the Faculty of Science and Technology and other researchers from relevant research institutes, as well as institutions of higher education and hospital-based research centers.

Parasitology Prof. Eran Dvir

5951202 - 2.5 Academic Credits

2 Hour Semester Lecture + 1 Hour Lab

The course will discuss the systematics, morphology, lifecycles, and epidemiology of parasites and arthropods, as well as the significance of insects, mites, and ticks as vectors of disease transmission and their economic importance. Furthermore, we will study the various defensive measures that may be taken against external parasites, and introduce those parasites bearing medical significance from the single-cell and worm groupings.

Primatology Dr. Alon Barash

5953399 – 3.0 Academic Credits

2 Hour Semester Lecture + 1 Field Trip+ 1 Hour Lab

The course offers an introduction to primates, with an emphasis on their evolution and taxonomy. We will learn about the prosimians, old and new world monkeys, and other families of that order, along with the anatomy,

biogeography, and behavior of certain species in this group. An emphasis will be given to the evolutionary development of apes during the past four million years.

Pathophysiology Prof. Eran Dvir

5951650 - 2.5 Academic Credits

2 Hour Weekly Lecture + 1 Hour Weekly Lab

Throughout the course, we will study about bodily system function and activity in conditions of illness. For example, during heart failure, types of cardiovascular shock, cardiogenic and anaphylactic shock. Types of anemia. Blood coagulation and clotting problems. Pulmonary edema, acid/base balance disorders, and various hypoxia types. Kidney failure, calcium homeostasis, and calcium supply disorders. Furthermore, we will deal with diseases affecting the digestive tract.

Research and Diagnostic Methods in Veterinarian Prof. Eran Dvir

4020035 - 2.0 Academic Credits

2 Hour Weekly Lecture

The course will review diagnostic, pre-clinical, and clinical research methods in animals. This course is intended to serve as an important tool for those dealing in animals, who engage with veterinarians or medical testing as well as researchers who examine the effects of medications on animals. During the course, students will be exposed to a variety of blood tests, sampling, and imaging procedures that can be implemented in animals, the protocol for these tests and the means of their interpretation.

***For those with a grade of 85 or higher**

Applied Laboratory Medicine Prof. Eran Dvir

5951764 - 2.5 Academic Credits

2 Hour Semester Lecture + 1 Hour Lab

The course will deal with “Medical Laboratory” (also known as Clinical Pathology) and its uses in Veterinary Medicine. Course topics include a variety of blood tests, such as complete blood count, blood film, and biochemical tests to clarify and examine the functioning of various organs. Other topics to be addressed are serological and molecular tests to identify causes of infection; identify toxins and diagnose biopsies. By the end of the course, students will be able to assist a veterinarian in taking samples, performing laboratory tests, and understanding the results. The course will also serve as a tool of general knowledge for understanding routine tests we all take at the request of our family doctors.

Biological Clocks and their Metabolic Aspects Dr. Roee Gutman

5951759 - 2.0 Academic Credits

2 Hour Semester Lecture

The course focuses on chronobiology – a field that examines periodical phenomena in living organisms (chrono = time; biology = the science of life). These periodical phenomena are the biological expression of how animals (and plants) adapt to cyclic changes in environmental conditions, such as changes in daylight and temperature, which derive from the earth's rotation around itself and the sun and the moon's rotation around the earth. Throughout the course, we will look at examples of biological rhythms and learn their adaptive significance to the normal functioning of living creatures in general and humans in particular; the physiological mechanisms as underlying components of the endogenous clock, the metabolic and medical aspects of disruptions in the internal clock. At the beginning of the course, we will describe diurnal, infradian and ultradian rhythms, and introduce the molecular mechanism of the internal clock and its synchronization by environmental factors. In the second part of the course, points will be drawn between nutrition, metabolism, and biological rhythms, and we will describe diseases and symptoms related to abnormal functioning or lack of synchronization of the internal clock, such as in the case of shift work.

Animal Cell Culture Prof. Gidi Gross

1032511- 1.5 Academic Credits

1 Hour Semester Lecture + 1 Hour Lab

Cell culture terminology; basic technologies for growing adherent and suspended cells; working under aseptic conditions; preparing growth media; freezing and thawing cells; cell counting; limiting dilution; cell cloning; gene delivery into cultured cells via DNA and RNA transfection or viral transduction; controlling and assaying expression level of genes of interest; using reporter genes; biological assays with indicator cells; introduction to stem cells. Changes may be made; updates can be found in the Biotechnology Department syllabus section.

Electives (*The opening of an elective is conditional upon the enrollment of 20 students and according to the annual curriculum.)

All Faculty Courses

In Favor of Myself Prof. Moria Golan

3022067- 2.0 Academic Credits

An online course for 2nd-year students

This course provides current information as to the concept of emotional resilience and the factors that mediate it. The course helps participants to develop an inner reflection on their strength resources and trains them to acquire tools of self-soothing and self-control. As this is an online course, each student may choose his or her suitable days and hours to complete it. The average time needed for each lecture and the assignment accompanying it is 60-90 minutes per week.

The course contains 12 units, one of which will be uploaded weekly. Each unit has a relevant assignment with a known, limited deadline. Be sure to submit assignment on time, as there will be no option for delayed submission. **Frontal, 1-hour sessions will take place in the beginning, the middle, and the end of the semester**.

Course objectives:

1. To provide knowledge and understanding of the concept of emotional resilience, self-regulation, and self-control
2. To foster deep understanding of the mediating factors of emotional resilience
3. To develop media literacy
4. To offer a platform for sharing and discussing ideas on how to resolve difficulties in emotional regulation or emotional resilience
5. To ameliorate destructive thinking patterns
6. To impart strategies to improve emotional resilience and self-control

Introduction to Programming (R) Dr. Sariel Hubner

1030700 – 2.0 Academic Credits

4 Hour workshop for 3rd-year students

This is a primary introduction course to the R environment and programming language. In the course, we will study a variety of tools and methods to process different types of datasets and means to present the results through tables and graphs. Students will be introduced to the R and R-studio environments, different types of objects, working with vectors and matrices, working with data frames, programming using loops and conditions, writing functions, working with external packages, statistical analyses, and chart design.