Bachelor of Science (BSc) Biology

A major in the biological sciences prepares students for communication of scientific knowledge, research and advanced study in the life sciences. Topics are studies in learning communities as students examine theories and ideas with an experimental inquiry. Upon completion of the program, the student will be able to:

- Describe the fundamental concepts of the biological sciences at an in-depth level.
- Appreciate scientific literature.
- Demonstrate a broad knowledge related to laboratory and field techniques.
- Demonstrate familiarity with sophisticated, state-of-the-art instrumentation.
- Perform scientific investigations and interpret scientific data.
- Demonstrate scientific writing skills.
- Relate problem-solving to scientific learning.
- Apply critical thinking skills to biological questions.
- Demonstrate preparation for entry and success in science related post graduate training programs, graduate and professional schools, industry or laboratory and field programs.

In addition to taking a comprehensive program of biology courses, biology majors have the opportunity to explore related fields such as chemistry, physics and mathematics. Graduates will have core scientific skills that can be used in a variety of ways, ranging from careers in education, industry or research to graduate study.

A student selecting the biology major must select a concentration as well and complete its course requirements as well as those of the biology major.

DURATION (FULL-TIME)

Minimum Duration: 4 Years (8 Semesters)
Maximum Duration: 7 Years

PROGRAMME MAP

YEAR 1

SEMESTER 1					SEMESTER 2			
COURSE CODE	**COURSE TITLE**	**Cr**	**Type**		**COURSE CODE**	**COURSE TITLE**	**Cr**	**Type**
WS100	Wesleyan Seminar (SL)	1	Non-Core	**Semester Break**	MATH171	Elementary Statistics	4	Core
MATH162	College Algebra and Trigonometry	4	Non-Core		BIO241	Anatomy and Physiology I	4	Core
BIO201	General Botany	4	Core		CHEM175	Principles of Chemistry I	4	Core
BIO211	General Zoology	4	Core		ENG110	College Research (WI)	3	Non-Core
ENG109	College Composition 1	3	Non-Core		DMD109	Survey of Visual Communication	3	Non-Core
	Total	**16**				**Total**	**18**	

YEAR 2

SEMESTER 1					SEMESTER 2			
COURSE CODE	**COURSE TITLE**	**Cr**	**Type**		**COURSE CODE**	**COURSE TITLE**	**Cr**	**Type**
CHEM176	Principles of Chemistry II	4	Core	**Semester Break**	BIO302	Plant Morphology	4	Core
BIO242	Anatomy and Physiology II	4	Core		BIO260	Ecology and Conservation	4	Core
EVHL330	Environmental Health	4	Core		BIO380	Topics in Biology	4	Core
MATH355	Introduction to Sets and Logic	3	Non-Core		PE107	Dance and Movement	3	Non-Core
SOC243	Social Problems	3	Non-Core					
	Total	**18**				**Total**	**15**	

YEAR 3

SEMESTER 1					SEMESTER 2			
COURSE CODE	**COURSE TITLE**	**Cr**	**Type**		**COURSE CODE**	**COURSE TITLE**	**Cr**	**Type**
BIO360	Cell and Molecular Biology	4	Core	**Semester Break**	BIO324	Taxonomy of Flora and Fauna	4	Core
BIO300	Ecosystems	4	Core		CHEM355	Organic Chemistry	4	Core
BIO312	Animal Development and Diversity	4	Core		PHYS210	General Physics I	4	Non-Core
PE352	Kinesiology	3	Non-Core		WS 357	Human Relations with Global Perspective (WI) (SL)	3	Non-Core
	Total	**15**				**Total**	**15**	

YEAR 4							
SEMESTER 1					SEMESTER 2		
COURSE CODE	COURSE TITLE	Cr	Type	Semester Break	COURSE CODE	COURSE TITLE	Cr	Type
BIO499A	Biology Seminar I	1	Core		BIO499B	Biology Seminar II	1	Core
BIO350	Microbiology	4	Core		BIO498	Internship	6	Core
BIO355	Genetics	4	Core		PHIL215	Ethics for Life and Career	3	Non-Core
BIO386	Bio Chemistry	4	Core					
	Total	**13**				**Total**	**10**	

Total Graduation Credits		
TYPE	**CREDITS**	**%**
Core	84	70%
Non-Core	36	30%
Total	**120**	**100%**

SUMMARY OF MODULES

YEAR 1 – SEMESTER 1

WS 100 Wesleyan Seminar - 1cr

This course offers instruction in accessing University resources, developing social and academic strategies for success, and participating effectively within the IW community. The course includes completion of an academic-service project as an integrative learning experience that promotes the ability to understand and apply the Life Skills, understand service as an aspect of IW's mission, and undertake critical reflection

MATH 162 College Algebra and Trigonometry - 4cr

Students satisfactorily completing this course will understand algebraic, exponential, logarithmic, and trigonometric functions. This course serves as a preparation for calculus. Not open to students who have successfully completed high school mathematics through advanced math or calculus except by consent of the instructor. Prerequisites: A working knowledge of algebra.

BIO 201 General Botany - 4cr

A course designed to give a basic knowledge of the anatomy and physiology of seed plants for students wishing to continue studies in biology and to give non-biology majors a general appreciation of plants. The relationships between structures and functions of the leaf, stem, root, flower, fruit, and seed are studied. Upon successful completion of this course, students will be able to describe the basic principles of botany, the structure and functions of different parts of plants, and to identify certain genera and species.

BIO 211 General Zoology - 4cr

A survey course, including laboratory, designed to acquaint the student in the fundamental principles of animal life, with emphasis on the structure and function of selected cells, tissues, organs, systems, and organisms. Upon successful completion of this course, students will be able to describe basic principles of zoology, the structure and functions of cells and organelles, and the concepts of animal life.

ENG 109 College Composition (WI) - 3cr

In this course, students will be introduced to college-level writing. Assignments will move from first-person essay to more traditional academic writing such as rhetorical analysis and persuasive essays. The course also examines visual texts and focuses on revision and reflective writing. The course promotes as learning outcomes an understanding of rhetorical foundations such as audience, voice, and genre; development of effective writing process that includes scaffolding and peer review; demonstration of research skills and accurate citation of sources; and participation in academic conversations that produce polished, final writings in a portfolio.

YEAR 1 – SEMESTER 2

MATH 171 Elementary Statistics - 4cr

An introduction to probability and statistics. Students satisfactorily completing this course will demonstrate skills in assignment of probability using permutations and combinations, distributions of random variables and statistics, and large sample theory, introduction to estimation and tests of significance. Includes Excel lab.

BIO 241 Human Anatomy and Physiology I - 4cr

This lecture/laboratory course introduces the student to the basic cell processes. It will also cover the anatomy and physiology of the tissues, integumentary, skeletal, muscular, and nervous system. Upon successful completion of this course, students will be able to describe the fundamental principles of anatomy and physiology at the chemical, cellular, tissue, organ, system and organismal levels. Prerequisites: 4 hrs of chemistry

CHEM 175 Principles of Chemistry I - 4cr

A mathematically based introductory course in chemistry. Topics include atomic and molecular structure, chemical relationships, quantitative relationships, and gas theories. Laboratory will emphasize concepts covered in lecture. Upon successful completion, students will be able to solve qualitative and quantitative problems involving stoichiometric relationships, will have an understanding of kinetic molecular theory and how it applies to the behavior of gases, and will possess the basic conceptual vocabulary necessary to understand chemical information. Prerequisites: Concurrent enrollment Math 162 or higher, or consent of instructor

ENG 110 College Research (WI) - 3cr

In this course, students will be introduced to college-level research. Assignments will focus on researching and creating knowledge about one's field or major through reflective writing, professional and scholarly resources, interviews with members of one's field. Essays will move from an initial sketch of the student's interests in the field to a report on the current job market to a research-driven essay examining a problem in the field and eventual revision and expansion with more scholarly sources. The course promotes as learning outcomes an understanding of discourse communities and professional networking; demonstration of thorough research techniques, knowledge gathering, implementation, and accurate citation of sources; and participation in professional conversations that produce work approaching those of incoming experts in the field.

DMD 109 Survey of Multimedia - 3cr

This course is an introduction to the broad field of multimedia. Students will learn problem-solving skills and design principles using the tools and resources implemented in this field. This class gives hands-on experience in five media: graphic design, image processing, sound design, video production and Web design. This an active-learning course focusing on creative assignments and online publishing. At the conclusion of this course, students will display their work on a personal Website designed by each student.

YEAR 2 – SEMESTER 1

CHEM 176 Principles of Chemistry II - 4cr

This course is a continuation of CHEM 175. Topics include kinetics, equilibria, acid-base concepts, electrochemistry and nuclear chemistry. Students successfully completing this course will have an understanding of current and historical acid-base theory and how it is applied experimentally, an understanding of the basic concepts governing the rates of chemical reactions, and an understanding of both qualitative and quantitative approaches to chemical equilibria. Prerequisites: CHEM 175

BIO 242 Human Anatomy and Physiology II - 4cr

This lecture/laboratory course introduces the student to the endocrine, cardiovascular, lymphatic, respiratory, digestive, urinary, and reproductive systems of the human body. Upon successful completion of this course, students will be able to demonstrate the anatomical and physiological interrelationships of these systems, and explain the components, structure and functions of the human body. Prerequisites: BIO 241

EVHL 330 – Environmental Health – 4cr

A lecture, laboratory, field study of the important principles of environmental health. The environmental factors that affect human health and well-being are emphasized. This course provides the basic knowledge and skills necessary to identify, evaluate, and communicate environmental conditions that have an impact on human health and to plan and/or implement strategies to control or manage environmental problems. Upon successful completion of this course, students will be able to describe the principles of environmental health, the impact of environmental conditions, and management strategies for environmental problems.

MATH355 – Introduction to Sets and Logic - 3cr

Students satisfactorily completing this course will be able to read, write and reason mathematically. Topics include elementary logic, sets and their properties, relations, functions, Boolean algebra, and finite and infinite sets.

SOC 243 Social Problems - 3cr

This course is designed to present an enlightened analytical review, understanding, and interpretation of contemporary social problems within the context of broad social and structural forces that make America what it is today. Emphasis is on the links between specific modern social problems and broader structural issues of inequality and the economic priorities in the United States today. Strategies for dealing with or solving social problems will be explored. Those who successfully complete the course will be able to identify and analyze the elements of most of the major social problems, especially in the United States.

YEAR 2 – SEMESTER 2

BIO 302 Plant Morphology - 4cr

A lecture and laboratory course designed to acquaint the student with morphological and ecological relationships of representative members of the plant kingdom. Morphogenesis and evolutionary trends are emphasized. Upon successful completion of this course, students will be able to describe in depth the morphology and evolution of plants. Prerequisites: BIO 201

BIO 260 Ecology and Conservation - 4cr

A lecture, laboratory, and field study of ecological principles as they apply to plant and animal interrelationships in their environment. Natural systems analysis and natural resource conservation are studied. Upon successful completion of this course, students will be able to demonstrate a knowledge of the basic concepts and applications of conservation.

BIO 380 – Topics in Biology – 4cr

This will be an intensive study of a selected topic and may include laboratory and/ or field work. The specific topics will be selected with regard for student needs and interests of the faculty. Upon successful completion of this course, students will be able to collect information on a specific topic in biology, compose a document to demonstrate scientific writings skills, and demonstrate the knowledge related to the topic studied. May be
repeated for different topics.

PE 107 Dance and Movement - 3cr

Survey of dance and dance history with emphasis on the relationship of dance and dance forms to the societies in which they developed. Development of knowledge and skill in folk and square dances, American country dances and ballroom dancing, cultural influences of folk arts. Participation in a variety of dances for school and adult recreation and lecture.

YEAR 3 – SEMESTER 1

BIO360 – Cell and Molecular Biology – 4cr
This course presents a systematic approach to concepts of cell and molecular biology with an emphasis on the biological and chemical processes that occur in the cell and how these are related to cell function. Students will understand these underlying principles and analyze the current scientific research that has led to the current view of the cell.
Prerequisites: BIO 211, CHEM 175 and CHEM 176

BIO 300 Ecosystem Studies - 1cr or 2cr
Intensive studies of natural areas and their inhabitants with emphasis on the development and functioning of specific ecosystems. Taxonomic, anatomical and physiological information will be presented through lectures, laboratory work and Internships. The specific ecosystems will be selected with regard to student demand and faculty availability. Upon successful completion of this course, students will be able to analyze and characterize specific ecosystems. May be repeated for different systems.

BIO 312 Animal Development and Diversity - 4cr
A lecture and laboratory course designed to acquaint the student with the anatomical and ecological diversity of the animal kingdom. Comparative life cycles of representative members of the major animal groups are studied. Upon successful completion of this course, students will be able to describe various life cycles, anatomy, and evolution of animals. Prerequisites: BIO 211

PE 352 Kinesiology – 3cr
The students will learn, through a detailed study, about the muscle and articulations of the human body. They will learn and understand the movements and actions of the muscles and articulations in relation to good posture and proper application of skills.

YEAR 3 – SEMESTER 2

BIO 324 Taxonomy of Flora and Fauna - 4cr
A lecture, laboratory, and field study of the classification, nomenclature, identification, and documentation of plants and animals. Specific flora and fauna will vary. Upon successful completion of this course, students will be able to identify and classify plants and animal using taxonomic keys. Prerequisites: BIO 201 or 211 or 260 or consent of instructor

CHEM 355 – Organic Chemistry – 4cr
This introductory survey course is centered around structure and is organized by functional groups. Nomenclature, properties, preparations, and reactions of the various groups will be studied. Students successfully completing this course will gain a knowledge of the standard approaches to organic chemical nomenclature, will become familiar with basic methods for determining and writing organic reaction mechanisms, including an understanding
of electron-pushing, and will begin learning some of the reactions and reagents useful for organic chemical transformations and synthesis. Laboratory techniques and basic reactions of organic compounds will be stressed. Students successfully completing this course will become proficient in typical methods of organic chemical isolation and purification, including liquid-liquid extraction, distillation, and recrystallization.
Prerequisites: CHEM 176

PHYS 210 General Physics I - 4cr
An introductory lecture and laboratory course in physics. This course deals with the principles of Newtonian mechanics, including concepts of motion, force, energy, momentum, the conservation laws, wave phenomena, and sound. Knowledge of algebra and trigonometry assumed.

WS 357 Human Relations with a Global Perspective - 3cr
This course will help students understand human relations and develop cultural competency. Students will demonstrate the acquisition of knowledge about and skill in interpersonal and intergroup relations that contribute to the development of sensitivity to and understanding of the values, beliefs, lifestyles, and attitudes of individuals and the diverse groups found in a pluralistic society. Using a range of learning activities, this class will provide students with a variety of perspectives on global events and issues, allowing students to understand the impact of their actions or inaction as global citizens. Students will begin to translate knowledge of human relations into attitudes, skills, and techniques which will result in favorable learning experiences for students.

YEAR 4 – SEMESTER 1

BIO 499A Biology Seminar I - 1cr

This course will involve student research on an approved Biology topic. Techniques of biological research, scientific writing, editing of scientific writing, and formal presentation of results will be discussed and analyzed. Upon successful completion of this course, students will be able to compose a professional document designed to disseminate a scientific report using proper format and style. Prerequisites: Primarily for juniors and seniors in the major but open to others with consent of the instructor

BIO 350 Microbiology - 4cr

An introductory course dealing primarily with the biology of bacteria, although other microorganisms are also studied. The importance of beneficial as well as disease- causing microorganisms is presented. Laboratory techniques for culturing and nutritional differentiation are studied and performed. Students will be able to isolate, culture, and identify various microorganisms. Prerequisites: 8 hours of biology, 4 hours of chemistry

BIO 355 Genetics - 4cr

An introductory course dealing with the principles of plant and animal inheritance. A basic study of the molecular structure and function of genetic material (DNA and RNA); basic cytology; and developmental, behavioral, and human genetics. Sex determination, linkage, chromosomal recombination, and recent discoveries and techniques in biotechnology are studied. Upon completion of this course, students will be able to demonstrate their understanding of the basic concepts of inheritance, the structure of DNA, and their ability to perform techniques such as PCR and electrophoresis. Prerequisites: MATH 171, 8 of biology, 8 of chemistry

BIO386 – Biochemistry – 4cr

An introductory lecture course. Topics include nomenclature, typical reactions, qualitative and quantitative analysis, and intermediary metabolism. Particular emphasis will be given to factors effecting enzyme kinetics and metabolic control. Students successfully completing this course will become familiar the general structure of prokaryotic and eukaryotic cells, will acquire knowledge of the various classes of bio-organic compounds and
their roles in cellular metabolism, and will learn the general metabolic pathways found in cells and multi cellular organisms.
Prerequisites: BIO 201, BIO 211, CHEM 355.

YEAR 4 – SEMESTER 2

BIO 499B Biology Seminar II - 1cr

This course will involve a formal oral presentation of Biology research and techniques of critiquing oral and written scientific works. Upon successful completion of this course, students will be able to present the information from Biology Seminar I in a professional and persuasive manner in both thesis form and as a journal article. Must be taken consecutively with Biology Seminar I. Prerequisites: Primarily for juniors and seniors in the major but open to others with consent of the instructor

BIO 498 Internship in Biology- 6cr to 12cr

This internship allows for practical work experience in biology. Specific guidelines, which include prerequisites and application procedures, may be obtained from the Division chairperson. Each student's individual internship must be approved by the Division before the student registers for or begins the internship. Upon successful completion, students will be able to describe their work experience in connection to their biology coursework, and express in writing what they learned in their field placement. Prerequisites: Senior standing in the major

PHIL 215 Ethics for Life and Career - 3cr

This course explores the ethical dimensions of human experience, especially with respect to work, professions, careers, and vocations. What is demanded of us as we enter into various careers? What would excellence in these fields require? Are there basic rules governing each profession, and if so, what broader goals do these rules serve? Are there basic rules or principles guiding human life in general? In all of these spheres of life, what does it mean to be good? Prerequisite: ENG 109 and ENG 110