



COLLEGE OF SCIENCE  
**INTEGRATED SCIENCE**  
**CURRICULUM**  
VIRGINIA TECH™

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**2018-2019**

**ISC Student  
Handbook**

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**INTEGRATED SCIENCE**  
CURRICULUM

# The Integrated Science Curriculum

*Are you passionate about science and math?*

*Do you seek to understand the big picture as well as all the really cool pieces?*

*Do you want to help solve the world's most pressing and complex problems through the power of science?*

Designed for students seeking an in-depth understanding of 21<sup>st</sup> century science, the **Integrated Science Curriculum (ISC)** provides a novel, integrated scientific foundation for any degree program in the College of Science. It employs a collaborative, active-learning environment emphasizing teamwork, skills acquisition, independent thought, and creativity. ISC prepares the scientists of the future by having students learn and work as do the most successful scientists of today.

**Modern science is becoming increasingly interdisciplinary and collaborative in nature.** A generation ago, the classic scientific disciplines (biology, chemistry, and physics) could stand independently in a way no longer possible. This is due to the increasingly complex scientific questions that we are asking; Questions that require knowledge stemming from all traditional scientific fields. If science majors want to sustain successful careers in a world where the pace of change will only accelerate, they need to be immersed in the new and evolving ways of thinking about and doing science. The ISC presents the foundations of physical, mathematical and life sciences in an integrated, active-learning mode so to produce students with a fundamental understanding of the connections between the traditional sciences.

The recent evolution of science, in no small measure driven by the rapid increase in computational power, has brought with it the emergence of important, new scientific fields. The ISC is an excellent entry path for the traditional bachelor's degrees in the College of Science (biological sciences, biochemistry, chemistry, economics, geosciences, mathematics, physics, psychology, and statistics), as well as for the new degree programs in computational modeling and data analytics, nanoscience, neuroscience, and systems biology.

Importantly, **the ISC is not just a repackaging of traditional courses. The ISC presents knowledge and techniques from traditional sciences as complements to one another, providing the means to understand large-scale societal problems, including the areas of food, energy, health, water, the environment, and more.** The ISC raises broad questions about these complex Earth systems that do not fall into a single scientific box. To address these questions, the ISC introduces and/or increases exposure to

advanced scientific topics not typically covered in introductory courses, such as organic chemistry, biochemistry, linear algebra, differential equations, numerical methods, and stochastic processes. Through this approach, ISC students come to understand the interrelationships of the sciences in a way that is not possible with a more conventional course structure.

The ISC is structured around the big issues and questions being asked around the world today. These questions require the integration of ideas and methods from all scientific discipline. The basic organizing themes and questions of the ISC include:

- 1) What is Life?
- 2) What is Matter?
- 3) What is Energy?
- 4) What is Motion?
- 5) What is Information?

**Administratively speaking, the ISC is not a degree program. It is a freshman-sophomore course sequence that provides an alternative entry to any major in the College of Science. Students who enroll in the ISC will still choose a major field of study, and in addition to the ISC course and lab will take courses specific to their chosen major.**

## How is the ISC structured?

The ISC is a 30 credit, two-year course sequence that covers the fundamentals of college-level chemistry, physics, and biology integrated with each other and with calculus, linear algebra, and statistics. In each of the four semesters the ISC course is worth 6 credits and meets every day for seventy-five minutes. In the first year the laboratory course is worth 2 credits and meets twice a week for 2.5 hours. In the second year the laboratory course is worth 1 credit and meets once a week for 2.5 hours. Example 2-year course schedules are shown here for the most common ISC majors. Please note that **these are examples only**. Your personal schedule will vary based on your AP and IB scores and any dual enrollment classes you have taken. Your ISC advisor and your major advisor will work closely with you to create your personalized schedule.

## Example ISC 2-year course schedules

Example 2-year schedule for an ISC student working towards a <b>BIOCHEMISTRY B.S.</b>					
Freshman Year					
Fall			Spring		
<u>course</u>		<u>credits</u>	<u>course</u>		<u>credits</u>
ISC 1105	Integrated Science I	6	ISC 1106	Integrated Science I	6
ISC 1115	Integrated Science Lab I	2	ISC 1116	Integrated Science Lab I	2
BCHM 1014	Intro to Biochemistry	1	BIOL 1106	Principles of Biology	3
ENGL 1105	First Year Writing	3	ENGL 1106	First Year Writing	3
	University Core/Electives	3		University Core/Electives	3
	<b>total:</b>	<b>15</b>		<b>total:</b>	<b>17</b>
Sophomore Year					
ISC 2105	Integrated Science II	6	ISC 2106	Integrated Science II	6
ISC 2115	Integrated Science Lab II	1	ISC 2116	Integrated Science Lab II	1
CHEM 2535	Organic Chemistry	3	BCHM 2114	Biochemical Calculations	2
CHEM 2545	Organic Chemistry Lab	1	CHEM 2536	Organic Chemistry	3
	University Core/Electives	6	CHEM 2546	Organic Chemistry Lab	1
			BIOL 2604	General Microbiology	3
			BIOL 2614	General Microbiology Lab	2
				*Lab optional- Can take in the Fall	
	<b>total:</b>	<b>17</b>		<b>total:</b>	<b>16-18</b>

Example 2-year schedule for an ISC student working towards a <b>BIOLOGICAL SCIENCES B.S.</b>					
Freshman Year					
Fall			Spring		
<u>course</u>		<u>credits</u>	<u>course</u>		<u>credits</u>
ISC 1105	Integrated Science I	6	ISC 1106	Integrated Science I	6
ISC 1115	Integrated Science Lab I	2	ISC 1116	Integrated Science Lab I	2
ISC 1004	ISC Orientation Seminar	1	BIOL 1106	Principles of Biology	3
ENGL 1105	First Year Writing	3	ENGL 1106	First Year Writing	3
	General Education Course	3		General Education Course	3
	<b>total:</b>	<b>15</b>		<b>total:</b>	<b>17</b>
Sophomore Year					
ISC 2105	Integrated Science II	6	ISC 2106	Integrated Science II	6
ISC 2115	Integrated Science Lab II	1	ISC 2116	Integrated Science Lab II	1
STAT 3615	Biological Statistics	3	BIOL 2004	Genetics	3
CHEM 2535	Organic Chemistry	3	CHEM 2536	Organic Chemistry	3
CHEM 2545	Organic Chemistry Lab	1	CHEM 2546	Organic Chemistry Lab	1
	General Education Course	3		General Education Course	3
	<b>total:</b>	<b>17</b>		<b>total:</b>	<b>17</b>

Example 2-year schedule for an ISC student working towards a <b>MICROBIOLOGY B.S.</b>					
Freshman Year					
Fall			Spring		
<u>course</u>		<u>credits</u>	<u>course</u>		<u>credits</u>
ISC 1105	Integrated Science I	6	ISC 1106	Integrated Science I	6
ISC 1115	Integrated Science Lab I	2	ISC 1116	Integrated Science Lab I	2
ISC 1004	ISC Orientation Seminar	1	BIOL 1106	Principles of Biology	3
ENGL 1105	First Year Writing	3	ENGL 1106	First Year Writing	3
	General Education Course	3		General Education Course	3
	<b>total:</b>	<b>15</b>		<b>total:</b>	<b>17</b>
Sophomore Year					
ISC 2105	Integrated Science II	6	ISC 2106	Integrated Science II	6
ISC 2115	Integrated Science Lab II	1	ISC 2116	Integrated Science Lab II	1
STAT 3615	Biological Statistics	3	BIOL 2604	General Microbiology	3
CHEM 2535	Organic Chemistry	3	BIOL 2614	General Microbiology Lab	2
CHEM 2545	Organic Chemistry Lab	1	CHEM 2536	Organic Chemistry	3
	General Education Course	3	CHEM 2546	Organic Chemistry Lab	1
	<b>total:</b>	<b>17</b>		<b>total:</b>	<b>16</b>

Example 2-year schedule for an ISC student working towards a <b>SYSTEMS BIOLOGY B.S.</b>					
Freshman Year					
Fall			Spring		
<u>course</u>		<u>credits</u>	<u>course</u>		<u>credits</u>
ISC 1105	Integrated Science I	6	ISC 1106	Integrated Science I	6
ISC 1115	Integrated Science Lab I	2	ISC 1116	Integrated Science Lab I	2
ISC 1004	ISC Orientation Seminar	1	BIOL 1106	Principles of Biology	3
MATH 1225	Calculus of a Single Variable	4	MATH 1226	Calculus of a Single Variable	4
ENGL 1105	First-Year Writing	3			
	<b>total:</b>	<b>16</b>		<b>total:</b>	<b>15</b>
Sophomore Year					
ISC 2105	Integrated Science II	6	ISC 2106	Integrated Science II	6
ISC 2115	Integrated Science Lab II	1	ISC 2116	Integrated Science Lab II	1
SYSB 2025	Intro to Systems Biology	3	SYSB 2026	Intro to Systems Biology	3
CHEM 2514	Survey of Organic Chemistry	3		CS Elective	3
ENGL 1106	First-Year Writing	3		General Education Course	3
	<b>total:</b>	<b>16</b>		<b>total:</b>	<b>16</b>

Example 2-year schedule for an ISC student working towards a <b>CHEMISTRY B.A.</b>					
Freshman Year					
Fall			Spring		
<u>course</u>		<u>credits</u>	<u>course</u>		<u>credits</u>
ISC 1105	Integrated Science I	6	ISC 1106	Integrated Science I	6
ISC 1115	Integrated Science Lab I	2	ISC 1116	Integrated Science Lab I	2
ENGL 1105	First-Year Writing	3	ENGL 1106	First-Year Writing	3
CHEM 1004	Chem First Year Experience	1		General Education Course	3
	General Education Course	3		General Education Course	3
<b>total:</b>		<b>15</b>	<b>total:</b>		<b>17</b>
Sophomore Year					
ISC 2105	Integrated Science II	6	ISC 2106	Integrated Science II	6
ISC 2115	Integrated Science Lab II	1	ISC 2116	Integrated Science Lab II	1
CHEM 2565	Principles of Organic Chem*	3	CHEM 2566	Principles of Organic Chem*	3
CHEM 2545	Organic Chemistry Lab*	1	CHEM 2546	Organic Chemistry Lab*	1
CHEM 2154	Analytical Chem for Majors	4	CHEM 2424	Descriptive Inorganic Chem	3
CHEM 2164	Analytical Chemistry Lab	1	MATH 2024	Intermediate Calculus	3
*Talk with your advisor about this course			*Talk with your advisor about this course		
<b>total:</b>		<b>16</b>	<b>total:</b>		<b>17</b>

Example 2-year schedule for an ISC student working towards a <b>CHEMISTRY B.S.</b>					
Freshman Year					
Fall			Spring		
<u>course</u>		<u>credits</u>	<u>course</u>		<u>credits</u>
ISC 1105	Integrated Science I	6	ISC 1106	Integrated Science I	6
ISC 1115	Integrated Science Lab I	2	ISC 1116	Integrated Science Lab I	2
MATH 1225	Calculus of a Single Variable	4	MATH 1226	Calculus of a Single Variable	4
ENGL 1105	First-Year Writing	3	ENGL 1106	First-Year Writing	3
CHEM 1004	Chem First Year Experience	1		General Education Course	3
<b>total:</b>		<b>16</b>	<b>total:</b>		<b>18</b>
Sophomore Year					
ISC 2105	Integrated Science II	6	ISC 2106	Integrated Science II	6
ISC 2115	Integrated Science Lab II	1	ISC 2116	Integrated Science Lab II	1
CHEM 2565	Principles of Organic Chem*	3	CHEM 2566	Principles of Organic Chem	3
CHEM 2154	Analytical Chem for Majors	4	CHEM 2555	Organic Synth & Tech Lab	2
CHEM 2164	Analytical Chemistry Lab	1	CHEM 2424	Descriptive Inorganic Chem	3
MATH 2204	Intro to Multivariable Calculus	3	MATH 2214	Intro to Differential Equations	3
*Talk with your advisor about this course					
<b>total:</b>		<b>18</b>	<b>total:</b>		<b>18</b>

Example 2-year schedule for an ISC student working towards a <b>COMPUTATIONAL MODELING &amp; DATA ANALYTICS (CMDA) B.S.</b>					
Freshman Year					
Fall			Spring		
<u>course</u>		<u>credits</u>	<u>course</u>		<u>credits</u>
ISC 1105	Integrated Science I	6	ISC 1106	Integrated Science I	6
ISC 1115	Integrated Science Lab I	2	ISC 1116	Integrated Science Lab I	2
MATH 1225	Calculus of a Single Variable	4	MATH 1226	Calculus of a Single Variable	4
CS 1114	Intro to Software Design	3	CS 2114	Soft Des & Data Structures	3
ENGL 1105	First-Year Writing	3	ENGL 1106	First-Year Writing	3
<b>total:</b>		<b>18</b>	<b>total:</b>		<b>18</b>
Sophomore Year					
ISC 2105	Integrated Science II	6	ISC 2106	Integrated Science II	6
ISC 2115	Integrated Science Lab II	1	ISC 2116	Integrated Science Lab II	1
CMDA 2005	Int Quantitative Science	6	CMDA 2006	Int Quantitative Science	6
MATH 2114	Linear Algebra	3		General Education Course	3
<b>total:</b>		<b>16</b>	<b>total:</b>		<b>16</b>

Example 2-year schedule for an ISC student working towards a <b>ECONOMICS B.A.</b>					
Freshman Year					
Fall			Spring		
<u>course</u>		<u>credits</u>	<u>course</u>		<u>credits</u>
ISC 1105	Integrated Science I	6	ISC 1106	Integrated Science I	6
ISC 1115	Integrated Science Lab I	2	ISC 1116	Integrated Science Lab I	2
MATH 1225	Calculus of a Single Variable	4	MATH 1226	Calculus of a Single Variable	4
ENGL 1105	First Year Writing	3	ENGL 1106	First-Year Writing	3
ECON 2005	Principles of Economics	3	ECON 2006	Principles of Economics	3
<b>total:</b>		<b>18</b>	<b>total:</b>		<b>18</b>
Sophomore Year					
ISC 2105	Integrated Science II	6	ISC 2106	Integrated Science II	6
ISC 2115	Integrated Science Lab II	1	ISC 2116	Integrated Science Lab II	1
	ECON Elective	3	ECON 3104	Microeconomic Theory	3
	General Education Course	3		ECON Elective	3
	General Education Course	3		General Education Course	3
<b>total:</b>		<b>16</b>	<b>total:</b>		<b>16</b>

Example 2-year schedule for an ISC student working towards a  
**HNFE B.S. - Science of Food, Nutrition, & Exercise Option**

Freshman Year					
Fall			Spring		
<u>course</u>		<u>credits</u>	<u>course</u>		<u>credits</u>
ISC 1105	Integrated Science I	6	ISC 1106	Integrated Science I	6
ISC 1115	Integrated Science Lab I	2	ISC 1116	Integrated Science Lab I	2
ENGL 1105	First-Year Writing	3	ENGL 1106	First-Year Writing	3
HNFE 1114	HNFE First-Year Seminar	1	BIOL 1106	Principles of Biology	3
	General Education Course	3	HNFE 1004	Food, Nutrition, and Exercise	3
	<b>total:</b>	<b>15</b>		<b>total:</b>	<b>17</b>
Sophomore Year					
ISC 2105	Integrated Science II	6	ISC 2106	Integrated Science II	6
ISC 2115	Integrated Science Lab II	1	ISC 2116	Integrated Science Lab II	1
CHEM 2514	Survey of Organic Chemistry*	3	BCHM 2024	Concepts of Biochemistry	3
BMSP 2135	Human Anatomy & Physiology	3	BMSP 2136	Human Anatomy & Physiology	3
BMSP 2145	Human Anatomy & Phys. Lab	1	BMSP 2146	Human Anatomy & Phys. Lab	1
	General Education Course	3	HNFE 2014	Nutrition Across the Life Span	3
	*Talk with your advisor about this course				
	<b>total:</b>	<b>17</b>		<b>total:</b>	<b>17</b>

Example 2-year schedule for an ISC student working towards a  
**HNFE B.S. - Dietetics Option**

Freshman Year					
Fall			Spring		
<u>course</u>		<u>credits</u>	<u>course</u>		<u>credits</u>
ISC 1105	Integrated Science I	6	ISC 1106	Integrated Science I	6
ISC 1115	Integrated Science Lab I	2	ISC 1116	Integrated Science Lab I	2
ENGL 1105	First-Year Writing	3	ENGL 1106	First-Year Writing	3
HNFE 1114	HNFE First-Year Seminar	1	BIOL 1106	Principles of Biology	3
	General Education Course	3	HNFE 1004	Food, Nutrition, and Exercise	3
	<b>total:</b>	<b>15</b>		<b>total:</b>	<b>17</b>
Sophomore Year					
ISC 2105	Integrated Science II	6	ISC 2106	Integrated Science II	6
ISC 2115	Integrated Science Lab II	1	ISC 2116	Integrated Science Lab II	1
CHEM 2514	Survey of Organic Chemistry	3	BCHM 2024	Concepts of Biochemistry	3
BMSP 2135	Human Anatomy & Physiology	3	BMSP 2136	Human Anatomy & Physiology	3
FST 2014	Introduction to Food Science	2	HNFE 3024	Science of Food Prep Lab	2
PSYC 1004	Introductory Psychology	3	HNFE 2014	Nutrition Across the Life Span	3
	<b>total:</b>	<b>18</b>		<b>total:</b>	<b>18</b>



Example 2-year schedule for an ISC student working towards a <b>MATHEMATICS B.S. - Traditional Option</b>					
Freshman Year					
Fall			Spring		
<u>course</u>		<u>credits</u>	<u>course</u>		<u>credits</u>
ISC 1105	Integrated Science I	6	ISC 1106	Integrated Science I	6
ISC 1115	Integrated Science Lab I	2	ISC 1116	Integrated Science Lab I	2
MATH 1225	Calculus of a Single Variable	4	MATH 1226	Calculus of a Single Variable	4
MATH 1004	Discovering Mathematics I	1	MATH 1044	Discovering Mathematics II	2
ENGL 1105	First Year Writing	3	ENGL 1106	First Year Writing	3
<b>total:</b>		<b>16</b>	<b>total:</b>		<b>17</b>
Sophomore Year					
ISC 2105	Integrated Science II	6	ISC 2106	Integrated Science II	6
ISC 2115	Integrated Science Lab II	1	ISC 2116	Integrated Science Lab II	1
MATH 2204	Intro to Multivariable Calculus	3	MATH 2214	Intro to Differential Equations	3
MATH 2114	Intro to Linear Algebra	3	MATH 3034	Intro to Proofs	3
	General Education Course	3		General Education Course	3
<b>total:</b>		<b>16</b>	<b>total:</b>		<b>16</b>

Example 2-year schedule for an ISC student working towards a <b>MATHEMATICS B.S. - ACM Option</b>					
Freshman Year					
Fall			Spring		
<u>course</u>		<u>credits</u>	<u>course</u>		<u>credits</u>
ISC 1105	Integrated Science I	6	ISC 1106	Integrated Science I	6
ISC 1115	Integrated Science Lab I	2	ISC 1116	Integrated Science Lab I	2
MATH 1225	Calculus of a Single Variable	4	MATH 1226	Calculus of a Single Variable	4
MATH 1004	Discovering Mathematics I	1	MATH 1044	Discovering Mathematics II	2
ENGL 1105	First Year Writing	3	ENGL 1106	First Year Writing	3
<b>total:</b>		<b>16</b>	<b>total:</b>		<b>17</b>
Sophomore Year					
ISC 2105	Integrated Science II	6	ISC 2106	Integrated Science II	6
ISC 2115	Integrated Science Lab II	1	ISC 2116	Integrated Science Lab II	1
MATH 2204	Intro to Multivariable Calculus	3	MATH 2214	Intro to Differential Equations	3
MATH 2114	Intro to Linear Algebra	3	MATH 3034	Intro to Proofs	3
	General Education Course	3	MATH 3054	Programming for Math	3
<b>total:</b>		<b>16</b>	<b>total:</b>		<b>16</b>

Example 2-year schedule for an ISC student working towards a  
**MATHEMATICS B.S. - ADM Option**

Freshman Year					
Fall			Spring*		
<u>course</u>		<u>credits</u>	<u>course</u>		<u>credits</u>
ISC 1105	Integrated Science I	6	ISC 1106	Integrated Science I	6
ISC 1115	Integrated Science Lab I	2	ISC 1116	Integrated Science Lab I	2
MATH 1225	Calculus of a Single Variable	4	MATH 1226	Calculus of a Single Variable	4
MATH 1004	Discovering Mathematics I	1	MATH 1044	Discovering Mathematics II	2
ENGL 1105	First Year Writing	3	ENGL 1106	First Year Writing	3
<b>total:</b>		<b>16</b>	*Students must talk to their Academic Advisor about the CS sequence.		<b>17</b>
Sophomore Year					
ISC 2105	Integrated Science II	6	ISC 2106	Integrated Science II	6
ISC 2115	Integrated Science Lab II	1	ISC 2116	Integrated Science Lab II	1
MATH 2204	Intro to Multivariable Calculus	3	MATH 2214	Intro to Differential Equations	3
MATH 2114	Intro to Linear Algebra	3	MATH 3034	Intro to Proofs	3
CS 1114	Intro to Software Design	3	CS 2114	Software Des. & Data Struct.	3
<b>total:</b>		<b>16</b>	<b>total:</b>		<b>16</b>

Example 2-year schedule for an ISC student working towards a  
**MATHEMATICS B.S. - MSTR Option**

Freshman Year					
Fall			Spring		
<u>course</u>		<u>credits</u>	<u>course</u>		<u>credits</u>
ISC 1105	Integrated Science I	6	ISC 1106	Integrated Science I	6
ISC 1115	Integrated Science Lab I	2	ISC 1116	Integrated Science Lab I	2
MATH 1225	Calculus of a Single Variable	4	MATH 1226	Calculus of a Single Variable	4
MATH 1004	Discovering Mathematics I	1	MATH 1044	Discovering Mathematics II	2
ENGL 1105	First Year Writing	3	ENGL 1106	First Year Writing	3
<b>total:</b>		<b>16</b>	<b>total:</b>		<b>17</b>
Sophomore Year					
ISC 2105	Integrated Science II	6	ISC 2106	Integrated Science II	6
ISC 2115	Integrated Science Lab II	1	ISC 2116	Integrated Science Lab II	1
MATH 2204	Intro to Multivariable Calculus	3	MATH 2214	Intro to Differential Equations	3
MATH 2114	Intro to Linear Algebra	3	MATH 3034	Intro to Proofs	3
MATH 2644	Math Tutoring (F)	1		CS Requirement	3
	General Education Course	3			
<b>total:</b>		<b>17</b>	<b>total:</b>		<b>16</b>

Example 2-year schedule for an ISC student working towards a NANOSCIENCE B.S.					
Freshman Year					
Fall			Spring		
<u>course</u>		<u>credits</u>	<u>course</u>		<u>credits</u>
ISC 1105	Integrated Science I	6	ISC 1106	Integrated Science I	6
ISC 1115	Integrated Science Lab I	2	ISC 1116	Integrated Science Lab I	2
MATH 1225	Calculus of a Single Variable	4	MATH 1226	Calculus	4
ISC 1004	ISC Orientation Seminar	1	ENGL 1105	First-Year Writing	3
NANO 1015	Intro to Nanoscience	3	NANO 1016	Intro to Nanoscience	3
<b>total:</b>		<b>16</b>	<b>total:</b>		<b>18</b>
Sophomore Year					
ISC 2105	Integrated Science II	6	ISC 2106	Integrated Science II	6
ISC 2115	Integrated Science Lab II	1	ISC 2116	Integrated Science Lab II	1
NANO 2114	Nano Research Seminar	1	NANO 2024	Q Physics of Nanostructures	4
CHEM 2514	Survey of Organic Chemistry	3	BIOL 2124	Cell & Molec Biology	2
ENGL 1106	First-Year Writing	3		General Education Course	3
	General Education Course	3			
<b>total:</b>		<b>17</b>	<b>total:</b>		<b>16</b>

Example 2-year schedule for an ISC student working towards a CLINICAL NEUROSCIENCE B.S.					
Freshman Year					
Fall			Spring		
<u>course</u>		<u>credits</u>	<u>course</u>		<u>credits</u>
ISC 1105	Integrated Science I	6	ISC 1106	Integrated Science I	6
ISC 1115	Integrated Science Lab I	2	ISC 1116	Integrated Science Lab I	2
NEUR 1004	Neuro Orientation Seminar	1	ENGL 1106	First-Year Writing	3
ENGL 1105	First-Year Writing	3	BIOL 1106	Principles of Biology	3
PSYC 1004	Introductory Psychology	3	NEUR 2025	Intro to Neuroscience	3
			NEUR 2035	Neuroscience Lab	1
<b>total:</b>		<b>15</b>	<b>total:</b>		<b>18</b>
Sophomore Year					
ISC 2105	Integrated Science II	6	ISC 2106	Integrated Science II	6
ISC 2115	Integrated Science Lab II	1	ISC 2116	Integrated Science Lab II	1
NEUR 2026	Intro to Neuroscience	3	NEUR 3044	Cell Molecular Neuroscience	3
NEUR 2036	Neuroscience Lab	1	CHEM 2536	Organic Chemistry*	3
CHEM 2535	Organic Chemistry*	3	CHEM 2546	Organic Chemistry Lab*	1
CHEM 2545	Organic Chemistry Lab*	1		General Education Course	3
*Talk with your advisor about this course			*Talk with your advisor about this course		
<b>total:</b>		<b>15</b>	<b>total:</b>		<b>17</b>

Example 2-year schedule for an ISC student working towards a  
**COMPUTATIONAL & SYSTEMS NEUROSCIENCE B.S.**

Freshman Year					
Fall			Spring		
<u>course</u>		<u>credits</u>	<u>course</u>		<u>credits</u>
ISC 1105	Integrated Science I	6	ISC 1106	Integrated Science I	6
ISC 1115	Integrated Science Lab I	2	ISC 1116	Integrated Science Lab I	2
ENGL 1105	First-Year Writing	3	ENGL 1106	First-Year Writing	3
NEUR 1004	Neuro Orientation Seminar	1	MATH 1226	Calculus of a Single Variable	4
MATH 1225	Calculus of a Single Variable	4	BIOL 1106	Principles of Biology	3
<b>total:</b>		<b>16</b>	<b>total:</b>		<b>18</b>
Sophomore Year					
ISC 2105	Integrated Science II	6	ISC 2106	Integrated Science II	6
ISC 2115	Integrated Science Lab II	1	ISC 2116	Integrated Science Lab II	1
NEUR 2025	Intro to Neuroscience	3	NEUR 2026	Intro to Neuroscience	3
NEUR 2035	Neuroscience Lab	1	NEUR 2036	Neuroscience Lab	1
STAT 3005	Statistical Methods*	3	STAT 3006	Statistical Methods*	3
CS 1114	Intro to Software Design	3	PSYC 1004	Introductory Psychology	3
		*Could switch for a gen ed course			*Could take STAT 3005 or gen ed course
<b>total:</b>		<b>17</b>	<b>total:</b>		<b>17</b>

Example 2-year schedule for an ISC student working towards a  
**COGNITIVE & BEHAVIORAL NEUROSCIENCE B.S.**

Freshman Year					
Fall			Spring		
<u>course</u>		<u>credits</u>	<u>course</u>		<u>credits</u>
ISC 1105	Integrated Science I	6	ISC 1106	Integrated Science I	6
ISC 1115	Integrated Science Lab I	2	ISC 1116	Integrated Science Lab I	2
NEUR 1004	Neuro Orientation Seminar	1	ENGL 1106	First-Year Writing	3
ENGL 1105	First-Year Writing	3	BIOL 1106	Principles of Biology	3
PSYC 1004	Introductory Psychology	3		General Education Course	3
<b>total:</b>		<b>15</b>	<b>total:</b>		<b>17</b>
Sophomore Year					
ISC 2105	Integrated Science II	6	ISC 2106	Integrated Science II	6
ISC 2115	Integrated Science Lab II	1	ISC 2116	Integrated Science Lab II	1
NEUR 2025	Intro to Neuroscience	3	NEUR 2026	Intro to Neuroscience	3
NEUR 2035	Neuroscience Lab	1	NEUR 2036	Neuroscience Lab	1
STAT 3615	Biological Statistics*	3	STAT 3616	Biological Statistics*	3
PSYC 1094	Principles of Psych Research	3		General Education Course	3
		*Could switch for a gen ed course			*Could take STAT 3005 or gen ed course
<b>total:</b>		<b>17</b>	<b>total:</b>		<b>17</b>

Example 2-year schedule for an ISC student working towards an <b>EXPERIMENTAL NEUROSCIENCE B.S.</b>					
Freshman Year					
Fall			Spring		
<u>course</u>		<u>credits</u>	<u>course</u>		<u>credits</u>
ISC 1105	Integrated Science I	6	ISC 1106	Integrated Science I	6
ISC 2115	Integrated Science Lab II	1	ISC 1116	Integrated Science Lab I	2
NEUR 1004	Neuro Orientation Seminar	1	ENGL 1106	First-Year Writing	3
ENGL 1105	First-Year Writing	3	BIOL 1106	Principles of Biology	3
PSYC 1004	Introductory Psychology	3		General Education Course	3
	<b>total:</b>	<b>14</b>		<b>total:</b>	<b>17</b>
Sophomore Year					
ISC 2105	Integrated Science II	6	ISC 2106	Integrated Science II	6
ISC 2115	Integrated Science Lab II	1	ISC 2116	Integrated Science Lab II	1
NEUR 2025	Intro to Neuroscience	3	NEUR 2026	Intro to Neuroscience	3
NEUR 2035	Neuroscience Lab	1	NEUR 2036	Neuroscience Lab	1
STAT 3615	Biological Statistics*	3	STAT 3616	Biological Statistics*	3
	General Education Course	3		General Education Course	3
	*Could switch for a gen ed course			*Could switch for a gen ed course	
	<b>total:</b>	<b>17</b>		<b>total:</b>	<b>17</b>

Example 2-year schedule for an ISC student working towards a <b>PHYSICS B.S.</b>					
Freshman Year					
Fall			Spring		
<u>course</u>		<u>credits</u>	<u>course</u>		<u>credits</u>
ISC 1105	Integrated Science I	6	ISC 1106	Integrated Science I	6
ISC 1115	Integrated Science Lab I	2	ISC 1116	Integrated Science Lab I	2
MATH 1225	Calculus of a Single Variable	4	MATH 1226	Calculus of a Single Variable	4
ENGL 1105	First Year Writing	3	MATH 2114	Intro to Linear Algebra	3
PHYS 2325	Seminar for Physics Majors	1	PHYS 2326	Seminar for Physics Majors	1
			PHYS 2974	Independent Study	3
	<b>total:</b>	<b>16</b>		<b>total:</b>	<b>19</b>
Sophomore Year					
ISC 2105	Integrated Science II	6	ISC 2106	Integrated Science II	6
ISC 2115	Integrated Science Lab II	1	ISC 2116	Integrated Science Lab II	1
MATH 2204	Intro to Multivariable Calculus	3	MATH 3214	Calculus of Several Variables	3
MATH 2214	Intro to Differential Equations	3	PHYS 3355	Intermediate Mechanics	3
PHYS 3324	Modern Physics	4	PHYS 2504	Mathematical Methods	3
	<b>total:</b>	<b>17</b>		<b>total:</b>	<b>16</b>

Example 2-year schedule for an ISC student working towards a <b>PSYCHOLOGY B.S.</b>					
Freshman Year					
Fall			Spring		
<u>course</u>		<u>credits</u>	<u>course</u>		<u>credits</u>
ISC 1105	Integrated Science I	6	ISC 1106	Integrated Science I	6
ISC 1115	Integrated Science Lab I	2	ISC 1116	Integrated Science Lab I	2
ENGL 1105	First Year Writing	3	ENGL 1106	First-Year Writing	3
PSYC 1024	Pathways Psych Major - FYE	2	PSYC 1094	Principles of Psych Research	3
PSYC 1004	Introductory Psychology	3		General Education Course	3
	<b>total:</b>	<b>16</b>		<b>total:</b>	<b>17</b>
Sophomore Year					
ISC 2105	Integrated Science II	6	ISC 2106	Integrated Science II	6
ISC 2115	Integrated Science Lab II	1	ISC 2116	Integrated Science Lab II	1
	PSYC Elective	3		PSYC Elective	3
	PSYC Elective	3		General Education Course	3
	General Education Course	3		General Education Course	3
	<b>total:</b>	<b>16</b>		<b>total:</b>	<b>16</b>

Example 2-year schedule for an ISC student working towards a <b>STATISTICS B.S.</b>					
Freshman Year					
Fall			Spring		
<u>course</u>		<u>credits</u>	<u>course</u>		<u>credits</u>
ISC 1105	Integrated Science I	6	ISC 1106	Integrated Science I	6
ISC 1115	Integrated Science Lab I	2	ISC 1116	Integrated Science Lab I	2
ISC 1224	Diff Calculus & the Integral	2	ENGL 1106	First-Year Writing	3
ENGL 1105	First Year Writing	3	MATH 1226	Calculus of a Single Variable	4
STAT 1004	Exp. Learning from Data	2	STAT 3005	Statistical Methods	3
	CS Elective	3			
	<b>total:</b>	<b>18</b>		<b>total:</b>	<b>18</b>
Sophomore Year					
ISC 2105	Integrated Science II	6	ISC 2106	Integrated Science II	6
ISC 2115	Integrated Science Lab II	1	ISC 2116	Integrated Science Lab II	1
MATH 2204	Intro to Multivariable Calculus	3	STAT 3104	Probability & Distributions	3
STAT 3006	Statistical Methods	3	MATH 2114	Intro to Linear Algebra	3
	General Education Course	3		General Education Course	3
	<b>total:</b>	<b>16</b>		<b>total:</b>	<b>16</b>

If you would like to compare these ISC schedules with more traditional schedules, you can find the graduation requirements for all Virginia Tech majors here:

<https://registrar.vt.edu/graduation-multi-brief/index1.html>

## What do I learn credit for through the ISC Program?

After completing the two-year ISC program, students will have earned equivalences in the following courses:

- BIOL 1105 Principles of Biology
- BIOL 1115-1116 Principles of Biology Lab
- CHEM 1035-1036 General Chemistry
- CHEM 1045-1046 General Chemistry Lab
- PHYS 2305-2306 Foundations of Physics
- MATH 1114 Elementary Linear Algebra
- MATH 1025-1026 Elementary Calculus

## State-of-the-art pedagogy in class and lab

The ISC is taught in the modern Student-Centered Active Learning Environment with Upside-down Pedagogies (SCALE-UP) classroom. This classroom is specifically designed for group work and hands-on assignments and activities. There is no instructor's lectern and no "front" and "back" to the classroom. Instead, there are round tables that seat 9 students each where students work and interact in groups. Instructors are free to roam around the classroom answering questions, sending one group to help another, or asking why a certain conclusion was reached. The primary goal of the SCALE-UP classroom is to establish a highly collaborative, hands-on, interactive learning environment. For more information on this state-of-the-art classroom, please visit:

<http://www.lib.vt.edu/instruct/classrooms/scaleupclass.html>

<https://www.youtube.com/watch?v=pUFud6MoHMo>

The ISC labs are taught in a state of the art teaching laboratory in the New Classroom Building. In the laboratory, data collection is seamlessly integrated with methods of data analysis, discovery and interpretation. ISC aims for laboratory experiences that are closely integrated with lecture material, making them mutually supportive pieces of the learning experience.

## What students are saying about ISC:

“At the end of the day, we are going to leave this program with a different perspective than a majority of the people at this university. I think that will give us a very distinct advantage in the future. It will help us with jobs. It will help us understand the world around us.”

**- Grant Shively, Biochemistry major**

“ISC focuses on team work, which is great because in the real world we all must work with others. Doctors must communicate with other doctors, researchers collaborate, and in any field you are going to be working with people with different strengths and weaknesses. Our teams consisted of different majors within the team, which allowed me to learn different perspectives from my team members.”

**-Kristen Fisher, Biological Sciences major**

“This innovative program efficiently prepared me for research and developed my critical thinking ability. It gave me many opportunities and experiences some underclassmen would not be able to have. It teaches science in a way that it is being used in modern research and this is how it prepares students to succeed in research and graduate school.”

**-Shaan Sharma, Neuroscience major**

“Modern advanced fields of science, such as nanoscience and neuroscience, are rapidly moving away from the traditional uni-topic discipline such as biology, chemistry, or physics, toward an overlap between the three. The predominant strength of ISC and what separates this program from traditional teaching resides in how professors from different fields come together in a single classroom to break the walls separating the traditional disciplinary barriers. As a result, the material is taught in a way that emphasizes the common base of the three classical disciplines.”

**-Kevin Tran Huu, Nanoscience major**

“Not only has ISC provided a meaningful way to understand the how and why behind science, but it has also helped me surround myself with people who have the same goals as me. Being surrounded by people similar to me has made me work harder and have a stronger base to rely on for continued support.”

**-Karthik Dhanireddy, Microbiology major**



# How to Join ISC

In order to join the ISC, students must apply using the application found at:

<http://ais.science.vt.edu/programs/isc.html>

The application requires an essay of 800 words or less that answers the question: “Why do you want to participate in the integrated science curriculum?” and a copy of your high school transcript.

If you have any questions about ISC before or after applying, please feel free to contact us. We are happy to answer any questions you may have and explore whether ISC is a good fit for you. We can also put you in contact with students who have been through the ISC program if you are interested in hearing a student’s perspective.

## Scheduling of classes

All incoming freshman will receive a schedule tailored to their major during summer orientation, after meeting with their advisor. If admitted to the ISC, we remove any science or math courses on your schedule that the ISC will cover (i.e., Principles of Biology, General Chemistry, Foundations of Physics, Calculus, etc.) and add the ISC class and lab. All ISC students will have a complete fall schedule before arriving on campus.

## ISC Orientation Seminar

For incoming freshmen, the first semester of college is full of change. It is very exciting, but can also be challenging and, at times, overwhelming. In order to help ISC freshman have a successful transition from high school to college, and to set them up for a successful college career, we have developed a 1-credit freshman seminar open to all ISC students during their first semester. Professor Michel Pleimling teaches this weekly 50-minute seminar and helps students navigate their first semester at Virginia Tech. This seminar also teaches study skills and habits that will help you excel in ISC, in your chosen major and in your career after graduation.

# Textbook Information

Currently, students need the following four textbooks for the two-year ISC program:

## 1) Physics Book:

- Physics for Scientists and Engineers: A Strategic Approach with Modern Physics (4th edition), ISBN-13 (9780134083148) by Knight – 24 month subscription

	Includes Pearson eText?	Access Length (Subscription)	Bookstore ISBN(s)	Price To Bookstore	Instant Access
Mastering	Y	24 Months	9780134083148	\$105.41	\$115.95
Mastering + Loose Leaf Text	Y	24 Months	9780134100098	\$178	\$0
Mastering + Print Text	Y	24 Months	9780133953145	\$248.35	\$0

## 2) Biology Book:

- Biology (11<sup>th</sup> edition), ISBN-13 (9781259188138) by Raven et al.

## 3) Chemistry and Biocalculus Books:

- Zumdahl, Chemical Principles, 8e. with OWLv2 Access
- Biocalculus : Calculus, Probability, and Statistics for the Life Sciences, Stewart and Day, 1e with WebAssign Access

**You can choose to access the Chemistry and Biocalculus books** through Cengage Unlimited— **a subscription that provides access to ALL Cengage ebooks and digital learning products for \$119.99 per term (extended subscriptions also available)**. One Cengage Unlimited subscription can be used across all courses where Cengage products are assigned, at no added cost. A free print rental is available, but you will have to pay \$7.99 for shipping.

**Start at the bookstore:** Check the bookstore first when purchasing Cengage Unlimited. If it's not sold there, it can be purchased at [cengage.com/unlimited](https://www.cengage.com/unlimited)

	Cengage Unlimited Subscription
<b>Price</b>	\$119.99 for 4-month access \$179.99 for 1-year access \$239.99 for 2-year access
<b>What's Included</b>	Your required course materials +entire Cengage catalog of 20,000+ ebooks, digital learning platforms and more

## What happens if I leave ISC?

We do not want you to leave ISC, but if you decide it is not the right fit for you and you want to leave, you will earn credit for the following courses, depending on how many semesters of ISC you complete.

### **After 1 semester:**

MATH 1025

It is also possible to get equivalence for PHYS 2305 if you take the thermal physics module (PHYS 2324) for transfer students in the following fall term and successfully pass the written exam. In order for you to not lose a full year due the fact that the module for transfer students will only be offered in Fall semesters, the Physics Department will allow you to enroll in PHYS 2306 in the Spring semester of your first year even though at this time you will not yet have received the equivalence for PHYS 2305.

### **After 2 semesters:**

CHEM 1035

CHEM 1045

MATH 1025

MATH 1026

PHYS 2305

### **After 3 semesters:**

BIOL 1105

BIOL 1115

BIOL 1116

CHEM 1035

CHEM 1045

CHEM 1036

CHEM 1046

MATH 1025

MATH 1026

MATH 1114

PHYS 2305

It is also possible to get equivalence for PHYS 2306 if you take the two modules on optics (PHYS 2344) and waves and sound (PHYS 2334) for transfer students in the following fall term and successfully pass the written exams.

## Who is involved with ISC?

The following people keep the ISC program running. Please feel free to contact any of us with questions!

Name	Title	Department	Email	Phone
<b>Administration</b>				
Cara Conley	Academic Advisor	Academy of Integrated Science	cara1@vt.edu	540-231-8132
Nora Dragovic	Program Manager & Advisor	Academy of Integrated Science	nora84@vt.edu	540-231-8131
<b>Faculty and Instructors</b>				
Lara Anderson	Assistant Professor	Physics	lara137@vt.edu	540-231-0317
Jing Chen	Assistant Professor	Biological Sciences	chenjing@vt.edu	540-231-1359
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Michel Pleimling	Professor	Physics/Academy of Integrated Science	pleim@vt.edu	540-231-2675
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Craig Tollin	Lab Coordinator	Academy of Integrated Science	ctollin@vt.edu	540-231-6759
John Tyson	University Distinguished Professor	Biological Sciences	tyson@vt.edu	540-231-4662
Sparkle Williams	ISC Program Leader	Academy of Integrated Science	swilliams@vt.edu	540-231-5508

## WE HOPE YOU JOIN ISC!

Since it started, the ISC program has been a great success at Virginia Tech. Students complete the program well prepared to face complex scientific questions that cannot be confined to a single scientific discipline. ISC students know how to think and work like scientists instead of simply being good at absorbing material presented in lecture. If you enjoy approaching science from many different angles and tackling large scale scientific challenges facing society today, then ISC is for you! We hope that you will join us on our journey to change the way students and professors learn and teach science.



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