

SCIENTIFIC ILLUSTRATION AND VISUALIZATION

Overview

The interdepartmental undergraduate Scientific Illustration and Visualization major is designed for students who want to combine their interests and aptitudes in science and art. Based on the theme of *Communicating Science Through Art*, the major prepares students for careers in biological visualization/illustration or for graduate education in medical visualization/illustration. Graduates enter fields such as biocommunications, environmental display design, freelance illustration, UX/UI and museum display design, creative technologies, instructional design, and various careers in the publishing, research and education, and visual communication industries.

Student Learning Outcomes

Throughout its over 40-year existence, the underlying philosophy of the program has been to emphasize both art and science; students take approximately equal credit hours in the two major areas. Another important guiding principle has been visual thinking and problem-solving, and a third is maintaining student proficiency in a wide range of visual communication methods and technologies so they have the skill to choose the most effective tools for a given communication objective. Upon completion of the Scientific Illustration and Visualization major, graduates will:

- Implement effective academic research methods and concept development processes for producing meaningful educational visual solutions.
- Demonstrate advanced science knowledge in a science focus area of choice (for example, pre-medical, or non-medical areas of life and earth science).
- Demonstrate the ability to deconstruct and visualize complex science in order to create accessible, accurate, aesthetic, and meaningful visual representations, including diagrammatic, realistic, and symbolic, for a range of outputs (print, modeled, online, mobile).
- Implement interdisciplinary thinking in team-based and independent projects.
- Flexibly adapt to new technology and communication challenges.
- Showcase and analyze works by articulating key visual elements in formal presentations, in written and oral format, and during assessments and critiques.
- Demonstrate effective use of design principles, problem solving skills, and visual organization.

- Demonstrate career-readiness and professional practice competencies.
- Exhibit an academic trajectory for engaging in life-long learning.

Entrance Requirements

Entrance into the Scientific Illustration and Visualization major is by application to the Scientific Illustration and Visualization Advisory Committee. Eligibility is based on an academic standard of at least 2.00 cumulative GPA on 30 credits of university level work and a consideration of artistic ability as demonstrated through submission of a portfolio of representative drawings or another artwork. Freshman and transfer students usually declare pre-Scientific Illustration and Visualization as their major while satisfying the conditions for entrance into the major, although other majors can be declared.

Degree Requirements

The information below outlines the specific requirements for the Scientific Illustration and Visualization, B.A. degree. There are four components to the program requirements:

- Liberal arts general education
- Science core and advanced courses
- Art core and advanced courses
- Electives

Part 1. College Requirements

a. Communication Proficiency Requirements

ENGL 1500	Critical Thinking and Communication (grade of C or better)	3
ENGL 2500	Written, Oral, Visual, and Electronic Composition (grade of C or better)	3
LIB 1600	Introduction to College Level Research	1
Any ENGL course in the range ENGL 3020 to ENGL 3160		3
Two semesters of college-level world language		0-8
Students with 3 years in high school world language are exempt		

Total Credits **10-18**

B. Liberal Arts and Sciences Requirements*

Arts and Humanities **		12
Natural Sciences and Mathematical Disciplines		
MATH 1040	Introduction to Probability	3-4
or MATH 1400 College Algebra		
or MATH 1430 Preparation for Calculus		
or MATH 1650 Calculus I		
or STAT 1010 Principles of Statistics		
or STAT 1040 Introduction to Statistics		
or COMS 1070 Windows Application Programming		

or more advanced		
CHEM 1630 & 1630L	College Chemistry and Laboratory in College Chemistry	5
or CHEM 1770 General Chemistry I and Laboratory in General Chemistry I		
CHEM 2310 & 2310L	Elementary Organic Chemistry and Laboratory in Elementary Organic Chemistry	4
Social Sciences ***		9
Total Credits		33-34

* Choose courses to meet *International Perspectives & U.S. Cultures and Communities* requirements

** See <https://las.iastate.edu/students/academics/general-education/> Consider *HIST 2800, HIST 2810; ARTH 2800, ARTH 2810; DSNS 1830*

*** See <https://las.iastate.edu/students/academics/general-education/>

Part 2. Course Requirements for Major in Scientific Illustration and Visualization

A. Biological Sciences Core

LAS 2930D	Special Projects: General (F.)	1
or LAS 1010 Orientation		
BIOL 2110 & 2110L	Principles of Biology I and Principles of Biology Laboratory I (F.S.)	4
BIOL 2120 & 2120L	Principles of Biology II and Principles of Biology Laboratory II (F.S.)	4
BIOL 2550 & 2550L	Fundamentals of Human Anatomy and Fundamentals of Human Anatomy Laboratory	4-5
or BIOL 2560 Fundamentals of Human Physiology and Fundamentals of Human Anatomy Laboratory		
or BIOL 3130 Principles of Genetics and Genetics Laboratory		
or BIOL 3350 Principles of Human and Other Animal Physiology and Principles of Human and Other Animal Physiology Laboratory		
or BIOL 3500 Comprehensive Human Anatomy		
or BIOL 3510 Comparative Vertebrate Anatomy and Comparative Vertebrate Anatomy Laboratory		
or BIOL 3650 Vertebrate Biology		
Note: BIOL 3500 and BIOL 3650 courses include labwork.		
BIOL 3560	Dendrology	3-4
or BIOL 3660 Plant Systematics		
or BIOL 4510 Plant Evolution and Phylogeny		
or BIOL 4540 Plant Anatomy		

GEOL 2020 & 2020L	History of the Earth and History of the Earth: Laboratory	3
or BIOL 3120 Ecology		
or BIOL 3150 Biological Evolution		

Total Credits **19-21**

B. Art Core

DSNS 1310	Drawing I (F.S.)	4
ART 2300	Drawing II (F.S.)	3
ART 2330	Watercolor Painting (F.S.)	3
ART 3080	Computer Modeling, Rendering and Virtual Photography	3
ART 3300	Drawing III: Life Drawing	3
SCIVZ 3230	Scientific Illustration Principles and Techniques	3
SCIVZ 3260	Digital Rendering	3
SCIVZ 3270	Illustration as Communication	3
SCIVZ 3370	Application of Scientific Illustration Techniques	3
SCIVZ 4970	Illustration Internship	1

Total Credits **29**

Beyond the core preparation, students must take 9 credits in the advanced science area and 12 credits in the advanced art area. The courses acceptable in these areas follow. Other courses in art and biological science may be acceptable. See academic advisors and/or the Scientific Illustration and Visualization Advisory Committee.

C. Advanced Art Area

Select 12 total credits from below. At least 6 credits must be studio classes. Some courses can be considered either pre-med illustration or general art; speak with your advisor for guidance.

Pre-Med Illustration Area		
ARCH 3350	Three-Dimensional Studio	3
ART 3300	Drawing III: Life Drawing	3
ART 4080	Principles of 3D Animation	3
ART 4300	Drawing IV	3
ART 4310	Character and Scene Design	3
ART 4320	Sequential Narrative Drawing	3
ART 4750	Interactive Art	3
ART 4820	Selected Topics in Studio Art	1-3
SCIVZ 3230	Scientific Illustration Principles and Techniques	3
SCIVZ 3260	Digital Rendering	3
SCIVZ 3370	Application of Scientific Illustration Techniques	3
SCIVZ 4900	Independent Study	1-3
SCIVZ 4910	Portfolio Design and Professional Development	2
SCIVZ 4940	Special Topics in Illustration	1-3

General Art Area

ART 2130	Studio Fundamentals: Painting	2
ART 2270	Introduction to Creative Digital Photography	3
ART 2380	Painting I	3
ART 3290	Creative Photography	3
ART 3380	Painting II	3
ART 3560	Relief Printmaking: Digital/Traditional	3
ART 3570	Intaglio and Monotype Printmaking: Digital / Traditional	3-4
ART 3580	Lithography: Digital / Traditional	3
ART 4070	Principles of Character Animation	3
ART 4090	Computer/Video Game Design and Development	3
ART 4380	Painting III	3
ART 4730	Video Art	3
SCIVZ 3950	Field Illustration	1-3
SCIVZ 4060	Introduction to 3D Organic Modeling in ZBrush	3
SCIVZ 4700	Data, Code, and Form	3
JLMC 3060	Broadcast Media Production (F.S.)	3
JLMC 3150	Digital Storytelling (F.S.)	3
STAT 3320	Visual Communication of Quantitative Information	3

D. Advanced Science Area

Select 9 credits total from below.

Medical Illustration Graduate School Preparation Science Area - required/recommended courses by most graduate schools

BBMB 3160	Principles of Biochemistry (F.)	3
BIOL 3130	Principles of Genetics (F.S.SS.)	3
BIOL 3140	Principles of Molecular Cell Biology (F.S.)	3
BIOL 3350	Principles of Human and Other Animal Physiology (S.)	3
BIOL 3520	Vertebrate Histology (S.)	4
BIOL 4230	Developmental Biology (S.)	3
BMS 3290	Anatomy and Physiology of Domestic Animals	3
BMS 4480	Principles of Human Gross Anatomy	4
GEN 3400	Human Genetics (F.S.SS.)	3
General Science Area		
AECL 3210	Ichthyology (S.)	3
AECL 3660	Natural History of Iowa Vertebrates (S.)	3
AECL 4570	Herpetology (F.)	2
AECL 4580	Ornithology (S.)	2
AECL 4590	Mammalogy (S.)	2
ANTHR 3070	Biological Anthropology (S.)	3
ANTHR 3190	Skeletal Biology (F.)	3

ANTHR 4240	Forensic Anthropology (S.)	3
BBMB 3010	Survey of Biochemistry (S.SS.)	3
BIOL 3120	Ecology (F.SS.)	4
BIOL 2550 & 2550L	Fundamentals of Human Anatomy and Fundamentals of Human Anatomy Laboratory	4
BIOL 2560 & 2560L	Fundamentals of Human Physiology and Fundamentals of Human Physiology Laboratory	4
BIOL 3130L	Genetics Laboratory (F.S.)	1
BIOL 3150	Biological Evolution (F.S.)	3
BIOL 3280	Molecular and Cellular Biology of Human Diseases (F.)	3
BIOL 3360	Ecological and Evolutionary Animal Physiology	3
BIOL 3500	Comprehensive Human Anatomy (F.)	4
BIOL 3510	Comparative Vertebrate Anatomy	3
BIOL 3510L	Comparative Vertebrate Anatomy Laboratory	2
BIOL 3530	Introductory Parasitology (S.)	3
BIOL 3540	Animal Behavior (F.)	3
BIOL 3550	Plants and People (S.)	3
BIOL 3560	Dendrology (F.)	3
BIOL 3640	Invertebrate Biology (F)	3-4
BIOL 3650	Vertebrate Biology (F.)	4
BIOL 3660	Plant Systematics (S.)	4
BIOL 3930A	North American Field Trips in Biology: Pre-trip Seminar	1
or BIOL 3930B	North American Field Trips in Biology: North American Field trip	
BIOL 3940A	International Field Trips in Biology: Pre-trip Seminar	1
or BIOL 3940B	International Field Trips in Biology: Field Trip to International Location	
BIOL 4020	Introduction to Pathology	3
BIOL 4300	Principles of Plant Physiology	3
BIOL 4360	Neurobiology (F.)	3
BIOL 4510	Plant Evolution and Phylogeny	4
BIOL 4540	Plant Anatomy (F.)	4
BIOL 4550	Bryophyte and Lichen Biodiversity	3
BIOL 4560	Principles of Mycology (F.)	3
BIOL 4740	Plant Ecology (S.)	3
BIOL 4880	Identification of Aquatic Organisms (F.S.)	1
DS 2010	Introduction to Data Science	3
DS 2020	Data Acquisition and Exploratory Data Analysis	3
ENT 3700	Insect Biology (F.)	3

ENT 3740	Insects and Our Health (S.)	3
GEOL 2020	History of the Earth	3
GEOL 1030	Age of Dinosaurs	1
GEOL 1080	Introduction to Oceanography	3
GEOL 1110	Geological Disasters	1
GEOL 1400	Climate and Society	3
GEOL 1600	Water Resources of the World	3
GEOL 3240	Energy and the Environment	3
GEOL 4120	Micropaleontology	3
GEOL 4150	Paleoclimatology	3
MICRO 3020	Biology of Microorganisms (F.S.SS.)	3
MICRO 3020L	Microbiology Laboratory (F.S.)	1
MICRO 3100	Medical Microbiology (F.)	3
MTEOR 2060	Introduction to Weather and Climate	3
MTEOR 3600	Ocean-Atmosphere Interactions	3
MTEOR 4040	Global Change	3
NREM 3010	Natural Resource Ecology and Soils (F.)	4
NREM 3300	Principles of Interpretation (S.)	3
PSYCH 3100	Brain and Behavior (F.S.)	3
SCIVZ 3950	Field Illustration	1-3
VPTH 4010	Basics of Medical Terminology	1

As majors in the College of Liberal Arts and Sciences, Scientific Illustration and Visualization students must meet College of Liberal Arts and Sciences (<http://catalog.iastate.edu/collegeofliberalartsandsciences/#lascollegerequirementstext>) and University-wide requirements (<http://catalog.iastate.edu/collegescurricula/>) for graduation in addition to those stated above for the major.

LAS majors require a minimum of 120 credits, including a minimum of 45 credits at the 3000/4000 level. You must also complete the LAS world language requirement and career proficiency requirement.

Students in all ISU majors must complete a three-credit course in U.S. Cultures and Communities and a three-credit course in International Perspectives. Check (<http://www.registrar.iastate.edu/courses/div-ip-guide.html>) for a list of approved courses. Discuss with your advisor how the two courses that you select can be applied to your graduation plan.

Scientific Illustration and Visualization, B.A. 120 minimum credits required.

Freshman					
Fall	Credits	Spring	Credits	Summer	Credits
LAS 1010		1 LIB 1600		1 Prepare application for major entry / apply during second year	
ENGL 1500		3 Humanities		3 Consider taking a science course over the summer	
CHEM 1630		4 BIOL 2120		3	
CHEM 1630L		1 BIOL 2120L		1	
BIOL 2110		3 ART 2300		3	
BIOL 2110L		1 Soc Sci Choice		3	
DSNS 1310		4 CHEM 2310 & 2310L or STAT or MATH		3-4	
		17			0
			17-18		0

Sophomore

Fall	Credits	Spring	Credits	Summer	Credits
Foreign Lang. or Humanities (ART 2800)		3-4 For Lang or Social Sci		3-4 Consider study abroad, or attending summer AMI / GNSI Conferences and enrolling in Art/ Science/ Techniques Workshops or Iowa Lakeside Lab to take advanced biology courses	
CHEM 2310 & 2310L or STAT or MATH		3-4 SCIVZ 3260		3 Consider conducting SCIVZ 4970 Internship over the summer	
SCIVZ 3230		3 ART 3300		3	
ENGL 2500		3 Humanities		3	
Science Core Course		3-4 Science Core Course		3-4	
LAS 2030		1			
		16-19	15-17	0	

Junior

Fall	Credits	Spring	Credits	Summer	Credits
SCIVZ 3270		3 SCIVZ 3370		3 Work with Advisory Committee to fine tune/plan senior portfolio	

Advanced Science or Science Core Course	3-4 Science Core Course or Advanced Science	3-4 If planning to attend graduate school, take GRE over the summer, or at the latest in the fall, and prepare up to 20 portfolio pieces for submission over the summer and fine tune in the fall
ART 3080	3 Soc Sci	3
Humanities or Social Sci	3 ART 2330	3
Advanced Science or Art	3 Humanities and Advanced Art	3
Consider taking SCIVZ 4910, Portfolio Design and Professional Development, to begin preparing for post-graduation steps		
		15-16
		15-16
		0

Senior

Fall	Credits	Spring	Credits
Advanced Science	3-5 Advanced Science	3-4	

Advanced Art	3-6 Advanced Art	3-6
Humanities/ Social Elective	3 Humanities/ Social Sci/ Elective	3-6
BPMI 4970	1 Advanced English or Elective (ENGL 3020 through ENGL 3160 count as Advanced English)	3
Advanced English or Elective	2-3	
12-18		12-19

Minor

A minor in Scientific Illustration and Visualization is offered. A minimum of 17 credits must be taken, including 8 credits in biological science courses and 9 credits in art and design courses. The minor must include at least 3 credits that are not used to meet any other department, college, or university requirement.

The biological sciences must include:

BIOL 2110	Principles of Biology I	3
BIOL 2110L	Principles of Biology Laboratory I	1
BIOL 2120	Principles of Biology II	3
BIOL 2120L	Principles of Biology Laboratory II	1

The art and design courses must include:

SCIVZ 3230	Scientific Illustration Principles and Techniques	3
SCIVZ 3370	Application of Scientific Illustration Techniques	3
Advanced drawing, illustration, electronic media or painting course		3

For more information, contact the Scientific Illustration and Visualization advisor or view the website listed above.

The Scientific Illustration and Visualization Undergraduate Minor is an LAS Minor. In addition to University policies governing minors (<http://catalog.iastate.edu/academics/#degreeplanningtext>), LAS minors require at least 6 credits in courses numbered 3000 and above, with a grade of C or higher.