TECHNOLOGY, ARTS AND MEDIA

Courses in Technology, Arts and Media (TAM) are offered through the ATLAS Institute (http://atlas.colorado.edu), a center of interdisciplinary research, learning and collaboration in engineering, creative technologies and design. With strong ties to the technology sector in Colorado and beyond, ATLAS is a vibrant and growing community of researchers, instructors and students from the arts, sciences, social sciences and engineering, whose interest in the creative application of diverse technologies creates a culture of innovation and interdisciplinary collaboration.

Created to equip students with new and adaptable skill sets for the ever-expanding digital landscape, the Technology, Arts and Media (TAM) program offers a bachelor of science, as well as minor and certificate programs. Through both the core curriculum and electives, TAM offers students a wide range of learning opportunities in subjects such as programming, physical computing, digital media, virtual reality, technology education, mobile application development, design, history of technology, big data, virtual reality, web design, user-interface/user-experience, robotics and wearable technology.

Course code for this program is ATLS.

Centers and Labs

The ATLAS Institute is affiliated with the University of Colorado Boulder College of Engineering and Applied Science and the Graduate School. With a strong emphasis on design, research, project-based learning, and creative production, the institute includes a wide range of research labs, creative studios and learning facilities:

Laboratory for Playful Computation (https://www.colorado.edu/atlas/laboratory-playful-computation-lpc)
A research lab that designs playful and programmable technologies to create new possibilities for fun, creative, and expressive STEM and computing-based learning.

Interactive Robotics and Novel Technologies (IRON) Lab (https://www.colorado.edu/atlas/iron-lab)
A research lab that explores human-centered principles for developing novel sensing, interactive and robotic technologies, blending methods and techniques from computer science, design, engineering and the social sciences.

Unstable Design Lab (https://www.colorado.edu/atlas/unstable-design-lab)
A research lab that studies technology and culture through the design and development of technologies that embrace chance and uncertainty.

Laboratory for Emergent Nanomaterials (https://www.colorado.edu/atlas/laboratory-emergent-nanomaterials)
A research lab that manipulates matter on the smallest of scales to create materials with emergent properties, characterized by novel and sometimes surprising features arising from the interactions of multiple bodies.

A (https://www.colorado.edu/atlas/laboratory-emergent-nanomaterials)CME Lab (https://www.colorado.edu/atlas/acme-lab)
The ACME Creativity Machine Environment (ACME) research lab explores computational tools for design, creativity, cognition, tangible and embedded interaction, and computing for health and wellness.

THING Lab (https://www.colorado.edu/atlas/thing-lab)
The Transformative Human Interfaces for the Next Generation (THING) research lab employs shape-changing materials, novel sensors and unique design methods to make digital information tangible, paving the way for a new generation of interactivity that goes beyond sight and sound.

Living Matter Lab (https://www.colorado.edu/atlas/living-matter-lab)
A research lab that desires to pioneer new technologies that empower individuals by making information about their own biology and biome more accessible.

BTU Lab (https://www.colorado.edu/atlas/blow-things-btu-lab-0)
A dynamic teaching facility, creative studio, and hackerspace that provides a range of physical computing, electronics, and fabrication technologies, including a laser cutter, 3D printers and computers.

Whaaat!? Lab (https://www.colorado.edu/atlas/whaaat-lab)
A game-focused learning lab that provides a range of emerging technologies for the exploration, project development and creative applications of games and experimental interactions.

Heliolab (https://www.colorado.edu/atlas/heliolab)
A facility that provides a range of technologies and materials for investigating digital imaging and photography through the production of creative works and projects.

Center for Media, Arts and Performance (https://www.colorado.edu/atlas/labscenters/center-media-arts-and-performance-cmap)
Centered around the ATLAS Black Box Experimental Studio, where creativity and engineering blend with the performing arts, CMAP is an incubator for the novel and experimental use of technology in music, dance, visual art, theater, film and new media.

Bachelor’s Degree

- Technology, Arts and Media - Bachelor of Science (BS) (catalog.colorado.edu/undergraduate/colleges-schools/engineering-applied-science/programs-study/technology-arts-media/technology-arts-media-bachelor-science-bs)

Minor

- Technology, Arts and Media - Minor (catalog.colorado.edu/undergraduate/colleges-schools/engineering-applied-science/programs-study/technology-arts-media/technology-arts-media-minor)
Faculty
While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member’s home department.

Bethancourt, Matthew R. (https://experts.colorado.edu/display/fisid_156489)
Senior Instructor; MFA, Parsons School of Design

Bruns, Annie
Instructor; PhD, Northwestern University

Bruns, Carson J. (https://experts.colorado.edu/display/fisid_159851)
Assistant Professor; PhD, Northwestern University

Carruth, Christopher (https://experts.colorado.edu/display/fisid_153706)
Instructor; MS, University of Colorado Boulder

Devendorf, Laura (https://experts.colorado.edu/display/fisid_158564)
Assistant Professor; PhD, University of California, Berkeley

Do, Ellen Yi-Luen (https://experts.colorado.edu/display/fisid_159925)
Professor; PhD, Georgia Institute of Technology

Hales, Ian W. (https://experts.colorado.edu/display/fisid_134701)
Instructor; MS, University of Denver

Hein, Arielle (https://experts.colorado.edu/display/fisid_157379)
Instructor; MPS, New York University

Hoth, Kevin J. (https://experts.colorado.edu/display/fisid_149219)
Instructor; MFA, University of Washington

Leithinger, Daniel (https://experts.colorado.edu/display/fisid_163356)
Assistant Professor; PhD, Massachusetts Institute of Technology

Pierce, Aileen J. (https://experts.colorado.edu/display/fisid_134704)
Senior Instructor; BS, Carnegie Mellon University

Schaal, David A. (https://experts.colorado.edu/display/fisid_114824)
Instructor; MFA, University of Colorado Boulder

Shapiro, Ben (https://experts.colorado.edu/display/fisid_156418)
Assistant Professor; PhD, Northwestern University

Swanson, Joel E. (https://experts.colorado.edu/display/fisid_134311)
Assistant Professor; MFA, University of California, San Diego

Szafir, Daniel J. (https://experts.colorado.edu/display/fisid_156420)
Assistant Professor; PhD, University of Wisconsin–Madison

Courses
ATLS 1100 (3) Design Foundations
Introduces foundational principles, practices and methods of design. Emphasizes design as an expressive and creative problem solving tool. This course engages with design from a broad perspective including visual, computational, physical and auditory design practices. Through lectures, discussions and creative projects, students will gain a familiarity with the diverse applications of creative technology through design.

Requisites: Restricted to Technology, Arts and Media (TMEN) majors and (MTAM) minors only

Grading Basis: Letter Grade

ATLS 1220 (4) Virtual Worlds: An Introduction to Computer Science
Introduces the fundamental principles of computer science using an online virtual world called Second Life as the “Laboratory” for this course. Students will learn how to program by creating objects of interest in Second Life. In-class and in-world discussions and readings will introduce the students to important ideas and concepts that shape the field of computer science. Does not count as Computer Science credit for the Computer Science BA, BS or minor.

ATLS 1240 (3) The Computational World
Introduces and explores the “computational style of thinking” and its influence in science, mathematics, engineering and the arts. Does not focus on the nuts and bolts of any particular programming language, but rather the way in which computing has affected human culture and thought in the past half century. Does not count as Computer Science credit for the Computer Science BA, BS, or minor.

ATLS 1300 (4) Computational Foundations 1
Instructs non-computer science students in analyzing problems and synthesizing programs for the solution, emphasizing good engineering practices for program construction, documentation, testing, and debugging. Uses Java for programming projects. Formerly ATLS 2010.

Requisites: Restricted to TMEN or MTAM students only.

ATLS 1710 (3) Tools and Methods for Engineering Computing
Designed for students with little or no programming background. Students learn procedural and object-oriented programming through development of games, simulations, and animations using Flash/Actionscript, VB/Excel, Java, MATLAB, and real-world applications. Activities are oriented toward smaller projects that address topics in beginning science, engineering, and mathematics courses. Students gain practical, applicable skills.

ATLS 2000 (3) The Meaning of Information Technology
Surveys the history of information technologies and modern techniques of information production, storage, transmission, and retrieval. Emphasizes understanding not only the technological transformations in interpersonal, organizational, and mass communication, but also the technological, social and political changes that underlie the movement toward a digital society.

Equivalent - Duplicate Degree Credit Not Granted: HUEN 2020

Requisites: Restricted to Technology, Arts and Media (TMEN) majors or (MTAM-MIN) minors or ATLAS (PATL) student group.

ATLS 2001 (3) Design Technologies: Toolkit
Introduces students to the fundamentals of creative design through digital media production. Throughout the semester, students explore a number of disciplines related to digital media including imaging, web development, animation, video production, and more. Class sessions are in lecture format and are aimed at helping students attain a strong conceptual and technical understanding of creative design.

Requisites: Requires prerequisite or corequisite course of ATLS 2000 (minimum grade C). Restricted to PATL students.

Grading Basis: Letter Grade

ATLS 2002 (3) Design Technologies: Process
Introduces foundational principles, practices and methods relating to the process of creative design. Emphasis on the pre-production process as a creative problem-solving tool in order to produce innovative and interesting creative work. Through lectures, discussion and creative projects, students will gain a familiarity with diverse applications and practices related to creative technology and design.

ATLS 2036 (3) Introduction to Media Studies in the Humanities
Serves as an introduction to media studies specifically from a humanities perspective. Studies both histories and theories of media from the 20th and 21st centuries. Touches on methodologies for undertaking media studies (including distant ready and media archaeology). Objects of study may include such topics as film, radio, social media platforms and games, as well as digital art and literature.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 2036
**Repeatability:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Technology, Arts and Media (TMEN) majors and (MTAM) minors, or the ATLAS (PATL) student group only.

ATLS 2100 (3) Image
Introduces techniques, technologies and concepts of digital image making and manipulation through lectures, projects and critiques. Focuses on digital photography, digital animation and digital video as a means to formal and expressive ends. This course also contextualizes practices and methodologies of digital imaging with historical and critical perspectives.
**Requisites:** Requires prerequisite course of ATLS 2000 or HUEN 2020 (minimum grade C). Restricted to TMEN and MTAM majors/minors only.

ATLS 2200 (3) Web
Introduces techniques, technologies and concepts of web design and development through lectures, projects and critiques. Focuses technically on HTML, CSS and JavaScript as the primary web technologies. Contextualizes the technical and societal implications of the Internet through historical and critical perspectives.
**Requisites:** Requires prerequisite course of ATLS 2000 or HUEN 2020 (minimum grade C). Restricted to TMEN and MTAM majors/minors only.

ATLS 2300 (3) Text
Introduces techniques, terminology and histories related to the design of text within digital and analogue media. Students will learn the fundamentals of design, typography and layout through lectures, projects and critiques. The curriculum surveys significant theoretical perspectives, historical periods and significant practitioners that influence the practice of typographic design.
**Requisites:** Requires prerequisite course of ATLS 2000 or HUEN 2020 (minimum grade C). Restricted to TMEN and MTAM majors/minors only.

ATLS 2519 (1-4) Special Topics in Technology, Arts and Media
Analyzes special interest areas of multidisciplinary technology, arts and media research and practice.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Technology, Arts and Media (TMEN) majors and (MTAM) minors, or the ATLAS (PATL) student group only.

ATLS 3100 (3) Form
Teaches the fundamentals of 3D modeling, 3D animation and 3D printing / rapid prototyping from a conceptual and sculptural perspective. Through topical lectures, technical demonstrations and creative projects the course will introduce students to the potentials of thinking and working within 3-dimensional spaces.
**Requisites:** Requires prerequisite course of ATLS 2000 (minimum grade C). Restricted to Technology, Arts and Media (TMEN) majors only.

ATLS 3110 (3) Motion
An animation-based projects course that advances student understanding of motion design in today's culture. Through active production and critical analysis, students will create new media projects and critically examine the history, social implications, and impacts of these forms of mass media.
**Requisites:** Restricted to Technology, Arts and Media (TMEN) majors and (MTAM) minors, or the ATLAS (PATL) student group only.

ATLS 3112 (1-3) Digital and Social Systems Professional Development
Supports students in developing professional skills and practices in human computer interaction, design of interactive systems, computer supported cooperative work, computer supported collaborative learning, educational technology, tools that support creativity, user-developed knowledge collections and gaming.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 3112
**Repeatability:** Repeatable for up to 10.00 total credit hours.

ATLS 3173 (3) Creative Climate Communication
We generate multimodal compositions on the subject of climate change and engage with various dimensions of issues associated with sustainability. We work to deepen our understanding of how issues associated with climate change are or can be communicated, by analyzing previously created expressions from a variety of media (interactive theatre, film, fine art, television programming, blogs, performance art, for example) and then be creating our own work.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVS 3173 and THTR 4173
**Recommended:** Prerequisite ENVS 1000.

ATLS 3200 (3) Sound
Introduces techniques, technologies and concepts of digital sound through lectures, projects and critiques. Focuses technically on digital sound creation, production, synthesis and interactivity. Explores various approaches to digital sound production through historical and conceptual perspectives.
**Requisites:** Requires prerequisite course of ATLS 2000 (minimum grade C). Restricted to Technology, Arts and Media (TMEN) majors only.

ATLS 3300 (3) Object: Introduction to Physical Computing
Introduces the fundamentals of physical computing. This class is an exploration of computing that starts from the perspective that humans are fundamentally physical beings. Students will design projects that interact with humans and the physical world and will learn to integrate sensors, motors, and simple electronics into creative projects. Projects will include interactive installations, art projects, games, and audio controllers.
**Requisites:** Requires prerequisite of ATLS 3000 or CSCI 1300 or CSCI 1320 (all minimum grade C-). Restricted to TMEN students only.

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Technology, Arts and Media
ATLS 3500 (1-3) Client Projects in Technology, Arts and Media
Allows undergraduate students to work on collaborative projects with faculty and with external organizations under faculty supervision. Focuses on teamwork, conceptual planning, technical design and development and working within real-world client environments. Critical skills include project research, planning, design, development, troubleshooting and presentation.
Repeatable: Repeatable for up to 6.00 total credit hours.
Requisites: Requires prerequisite course of ATLS 2000 (minimum grade C).
Recommended: Prerequisite ATLS 3020.
ATLS 3519 (1-3) Special Topics in Technology, Arts, and Media
Analyzes special interest areas of multidisciplinary technology, arts and media research and practice.
Repeatable: Repeatable for up to 21.00 total credit hours. Allows multiple enrollment in term.
Requisites: Requires prerequisite course of ATLS 2000 (minimum grade C). Restricted to Technology, Arts and Media (TMEN) majors and (MTAM) minors, or the ATLAS (PATL) student group only.
ATLS 3529 (1-3) Special Topics in Critical Perspectives in Technology
Analyzes critical perspectives in technology, art, and media. Within these courses, students will develop vocabularies, theoretical perspectives and critical approaches relevant to technology and its effects on culture and society.
Repeatable: Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
Requisites: Requires prerequisite course of ATLS 2000 (minimum grade C). Restricted to Technology, Arts and Media (TMEN) majors and (MTAM) minors, or the ATLAS (PATL) student group only.
Grading Basis: Letter Grade
ATLS 4010 (4) Capstone Projects I
The focus of this advanced practicum course is the development of an individual thesis project. Specific class sessions will feature a combination of lectures, demonstrations, guest speakers, lab sessions, and critiques. This course also entails group work, portfolio development, critical theoretical readings, and a significant written component.
Requisites: Requires prerequisite courses of ATLS 3100 and ATLS 3200 (all minimum grade C). Restricted to Technology, Arts and Media (TMEN) majors only.
ATLS 4040 (3) Game Design
Introduces students to game design, development, history, theory and culture through readings, discussion, game analysis and the iterative design process of non-digital games.
Equivalent - Duplicate Degree Credit Not Granted: ATLS 5040
Requisites: Requires prerequisite course of ATLS 2000 (minimum grade C). Restricted to Technology, Arts and Media (TMEN) majors and (MTAM) minors, or the ATLAS (PATL) student group only.
Grading Basis: Letter Grade
ATLS 4120 (3) Mobile Application Development
Provides a comprehensive overview of developing mobile applications using a range of technologies including software developers' kits, object-oriented programming and human interface design principles. Students incorporate leading edge technologies with their own academic pursuits and personal interests to develop mobile applications. Explores the social and cultural effects of app and mobile-based computing.
Equivalent - Duplicate Degree Credit Not Granted: ATLS 5120
Requisites: Requires prerequisite course of ATLS 3000 or ATLS 1300 or CSCI 1300 or CSCI 1320 (minimum grade C). Restricted to Technology, Arts and Media (TMEN) majors, MTAM minors or the ATLAS (PATL) student group only.
Grading Basis: Letter Grade
ATLS 4130 (3) Typography
This course is an advanced investigation of typography for visual communication and expression. Emphasis is placed on the analysis of meaning as conveyed through materials, technology, and design. Projects are experimental and are designed to challenge you to expand your understanding of the function of typography in communication, design, art, and culture.
Equivalent - Duplicate Degree Credit Not Granted: ATLS 5130
Requisites: Requires prerequisites ATLS 2200 and ATLS 2300 (both minimum grade C). Restricted to TMEN and MTAM students.
ATLS 4140 (3) Game Development
Builds on concepts and processes learned in ATLS 4040/5040. Reinforces game design principles through analysis and discussion of digital games, and introduces students to key practices in the development of digital game experiences, including game flow, mechanics, 2D and 3D graphics, and artificial intelligence.
Equivalent - Duplicate Degree Credit Not Granted: ATLS 5140
Requisites: Requires prerequisite ATLS 4040 (minimum grade C). Restricted to MTAM or TMEN students.
ATLS 4151 (3) Flow Visualization
Explores techniques for the visualization of the physics of fluid flows including seeding with dyes, particles and bubbles, and shadowgraphy and schlieren. Reviews optics and fluid physics, especially atmospheric clouds. Assignments are student-driven, to individuals and mixed teams of graduates, undergraduates, engineering majors and photography/video majors.
Equivalent - Duplicate Degree Credit Not Granted: ARTF 5200, MCEN 4151, MCEN 5151, CINE 4200 and ATLS 5151
Requisites: Restricted to Technology, Arts and Media (TMEN) majors and (MTAM) minors, or the ATLAS (PATL) student group only.
Additional Information: Arts Sci Gen Ed: Distribution-Arts Humanities
ATLS 4214 (3) Big Data Architecture
Provides students with a comprehensive survey of technologies used today in the collection, storage, processing, analytics and display of big data. Focuses on cultivating real world skills with students working on semester long projects to execute on a group project.
Equivalent - Duplicate Degree Credit Not Granted: ATLS 5214
Requisites: Requires prerequisite course of CSCI 2270 (minimum grade D). Restricted to TMEN, MTAM, CSEN, CSCI, and ATLAS (PATL) student group only.
Grading Basis: Letter Grade
ATLS 4230 (3) Case Studies in Information and Communication Technology for Development
Serves as foundation course for MS-ICTD program. Students will evaluate case studies across a range of technologies and applications. Students will learn how to match available technologies to human and environmental needs and resources, be introduced to the seminal work and leaders in the field, and discuss the future of ICTD as an emerging area of academic focus.
Equivalent - Duplicate Degree Credit Not Granted: ATLS 5230
ATLS 4320 (3) Mobile Application Development: Advanced Topics
Explores advanced topics in mobile application design and development, including examining different approaches to information design and the various user interaction models associated with them. Understanding how data is structured, accessed, stored and flows through apps is a core theme of the course. Explores the interaction with external data sources and storage models.
Equivalent - Duplicate Degree Credit Not Granted: ATLS 5320
Requisites: Requires a prerequisite course of ATLS 4120 (minimum grade D-). Restricted to College of Engineering (ENGRU) undergraduates only.
Grading Basis: Letter Grade

ATLS 4519 (1-4) Advanced Special Topics in Technology, Arts, and Media
Analyzes special interest areas of multidisciplinary technology, arts and media research and practice.
Repeatable: Repeatable for up to 32.00 total credit hours. Allows multiple enrollment in term.
Requisites: Requires prerequisite course of ATLS 2000 (minimum grade C). Restricted to Technology, Arts and Media (TMEN) majors and (MTAM) minors, or the ATLAS (PATL) student group only.

ATLS 4529 (1-3) Advanced Special Topics: Critical Perspectives in Technology
Analyzes critical perspectives in technology, art and media. Within these courses, students will develop vocabularies, theoretical perspectives and critical approaches relevant to technology and its effects on culture and society.
Equivalent - Duplicate Degree Credit Not Granted: ATLS 5529
Repeatable: Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
Requisites: Requires prerequisite course of ATLS 2000 (minimum grade C). Restricted to Technology, Arts and Media (TMEN) majors and (MTAM) minors, or the ATLAS (PATL) student group only.
Grading Basis: Letter Grade

ATLS 4606 (3) Mastery in Information Science: Critical Technical Practice
Surveys design theory and methods that can be used to question relationships between technology, culture, and the environment. Students will discuss readings and synthesize those readings through design exercises. The course will equip students with resources for thinking more critically and creatively about design and possible future human-technology relationships.
Equivalent - Duplicate Degree Credit Not Granted: INFO 5606, INFO 4606, and ATLS 5606
Grading Basis: Letter Grade

ATLS 4630 (3) Web Front-End Development
Explores interactivity on the web using front-end web development concepts and technologies. Students will work with a range of technologies including JavaScript, jQuery, HTML5, APIs and user interface design methods to create interactive web applications. Individual and group projects will include animations, games, interactive narratives and web applications.
Equivalent - Duplicate Degree Credit Not Granted: ATLS 5630
Requisites: Requires prerequisite courses of ATLS 2200 and ATLS 3000 or CSCI 1300 or CSCI 1320 (all minimum grade C).

ATLS 4809 (3) Computer Animation
Develops a firm understanding of the general principles of computer animation. Lectures cover the creation of models, materials, textures, surfaces, and lighting. Path and key frame animation, particle dynamics, and rendering are introduced. Students are assigned a number of animation tutorials to carry out.
Equivalent - Duplicate Degree Credit Not Granted: ATLS 5809 and CSCI 4809 and CSCI 5809
Requisites: Restricted to Technology, Arts and Media (TMEN) majors, MTAM minors, or the ATLAS (PATL) student group only.

ATLS 4889 (3) Interactive Machine Learning for Customizable and Expressive Interfaces
Introduces students to techniques for applying machine learning in the development of customizable human-computer interfaces. Students learn to process a wide variety of input data (e.g. video and accelerometer streams) using different machine learning algorithms to detect semantically meaningful events that can afford the construction of new interactive systems. Students complete substantial projections within the domains of assistive or creative technologies. Does not fulfill Breadth Requirement for CSEN graduate students.
Equivalent - Duplicate Degree Credit Not Granted: CSCI 5880, CSCI 4889 and ATLS 5880
Requisites: Requires prerequisites of (APPM 3570 or APPM 4570 or CHEN 3010 or CSCI 3022 or CVEN 3227 or ECEN 3810 or ECON 3818 or MATH 3510 or MATH 4510 or MCEN 4120 or STAT 4520) and (CSCI 3002 or CSCI 3202 or CSCI 4448) (all minimum grade C-).
Grading Basis: Letter Grade

ATLS 4900 (1-3) Undergraduate Independent Study
Provides opportunities for independent study at the upper-division undergraduate level. Students work on research or a creative project guided by faculty. Department consent required.
Repeatable: Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
Requisites: Requires prerequisite courses of ATLS 3010 and 3020 (all minimum grade D-).