



DREXEL UNIVERSITY

First-Year
Exploratory Studies

Computing Majors Info Session





Did you know now all computing majors are housed in CCI?

In College of Computing and Informatics:

- Computer Science
- Software Engineering
- Information Systems
- Computing Security
- Data Science

In Westphal College of Media Arts and Design:

- Game Design and Production
- Interactive Digital Media
- Virtual Reality and Immersive Media

In College of Engineering

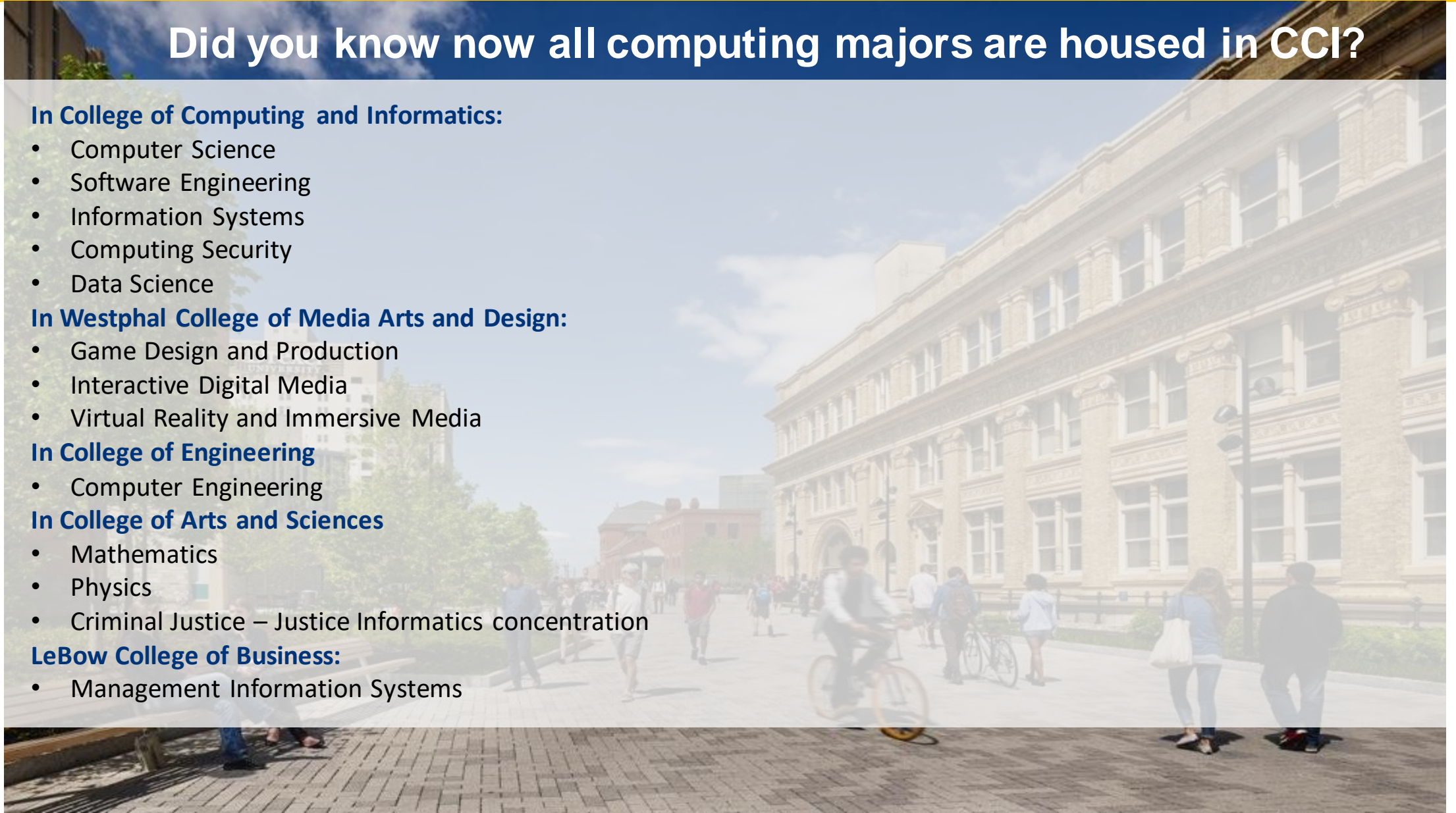
- Computer Engineering

In College of Arts and Sciences

- Mathematics
- Physics
- Criminal Justice – Justice Informatics concentration

LeBow College of Business:

- Management Information Systems





Computer Science: What do you study?

Curriculum emphasizes the theory and practice of effective computing. Students must select two tracks in a wide array of computing disciplines. CS majors tend to be skilled at math and writing code.

The CS major offers both a BS and a BA.

The BS program emphasizes foundation courses in the sciences and in applied mathematics, leading to careers involving applications in science and engineering. This major requires a full year of calculus and 5 additional math courses.

The BA program emphasizes foundation courses in the humanities and the social sciences, leading to careers involving applications in those areas. This major requires a full year of calculus and 5 additional math courses.

Required coursework for both degrees include

- Data Structures
- Mathematical Foundations of Computer Science
- Algorithms and Analysis

Optional Concentrations

- **Game Programming and Development**

provides conceptual understanding of game design and practical experience in the design and the development of games.

- **Computing Security**

gives students the ability to design and implement computing security and privacy processes, software and systems. Students use mathematical foundations, algorithmic principles and computer science theory in the modeling and design of such systems.



Computer Science: What can you do?

The following types of jobs are positions where a degree in computer science is a major asset:

- **Data scientist** - cleans and munges data to meet a company's purpose. Duties may include experimental frameworks for product development and machine learning with the aim to lay a strong data foundation for robust analytics to be performed.
- **Web developer** - responsible for the coding, design and layout of a website according to a company's specifications. A certain level of both graphic design and computer programming is necessary
- **Systems analyst** - analyzes how well software, hardware and the wider IT system fit the business needs of their employer or of a client.
- **Software developer** - researches, designs, implements and manages software programs; tests and evaluates new programs. Identifies areas for modification in existing programs and subsequently develops these modifications.
- **User interface designer** – makes sure that every page and every step a user will experience in their interaction with the finished product will conform to the overall vision created by UX designers.
- **Database administrator** – responsible for the performance, integrity and security of a database. You'll be involved in the planning and development of the database, as well as in troubleshooting any issues on behalf of the users.
- **Information security analyst** - monitors computer networks for security issues. Investigates security breaches and other cyber security incidents.
- **Information technology specialist** - is responsible for the implementation, monitoring, and maintenance of IT systems. ... Solve technical problems, such as computer systems, software, hardware, networks, cloud platforms, etc. .



Software Engineering: What do you study?

Students learn to design and build reliable, high-quality software products. Software engineering majors tend to be good at solving problems and writing code, and like to apply methods that allow individuals and teams to create and improve large software systems. **This major** This major requires a full year of calculus and 3 additional math courses.

The curriculum addresses a full range of software activities including gathering client requirements, designing and constructing software solutions, testing software, and modifying and extending existing systems. The curriculum also recognizes that most software is developed by teams, and students develop skills in project management and team operation.

Core courses address programming and use of software development tools, specification and design, software architecture, verification and validation, software evolution, and team projects. These courses are supplemented with courses drawn from computer science and Informatics that provide theoretical background and application knowledge.

Example of required Courses:

- Data Structures
- Advanced Programming Tools and Techniques
- Systems Architecture
- Human-Centered Design Process & Methods



Software Engineering: What can you do?

The following types of jobs are positions where a degree in computer science is a major asset:

- **Software Developer (applications and software)**
- **Web developer**
- **User interface designer**
- **Network Engineer** – creates computer networks to connect all employees within a company. Network engineers may work together or may be individually employed by companies to supervise and perform regular maintenance on company networks in addition to fixing technological problems that arise with those networks.



Information Systems: What can you study?

Students learn how to interact with people and businesses to understand their needs and translate them into effective systems and technology to improve efficiency;

The Information Systems curriculum prepares students for a wide range of information technology applications. Students learn how to determine client needs, design appropriate solutions, specify data architectures, and improve the usability of systems.

Students may take either the Math Analysis I and II or Calculus I and II plus two additional math courses, including STAT 201.

The core courses in the program address topics including

- fundamentals of programming
- systems analysis and design
- database management systems
- networking, security and privacy
- social aspects of information systems

The technical courses are supplemented by courses in business, behavioral sciences, natural sciences, mathematics, and the humanities to provide balance and useful supplemental materials for information systems careers.



Information Systems:

What can you do?

The majority of organizations depend on the design, implementation and management of IT. As an information systems graduate, your skills will be invaluable to employers from a range of sectors. This major requires 4 math courses, Jobs include:

- **Security Analyst** - keeps an organization's proprietary and sensitive information secure. identifies and corrects flaws in the company's security systems, solutions, and programs while recommending specific measures that can improve the company's overall security posture.
- **Systems Analyst**
- **Database Architect** – determines database structural requirements by analyzing client operations, applications, and programming; reviewing objectives with clients; evaluating current systems
- **Data Communications Analyst** - deals with testing, proofing, and designing various network systems for LANs (local area networks), WANs (wide area networks), and the Internet.
- **User Interface Designer**
- **Systems Engineer** – Creates and implements systems software, analyzes data to improve existing systems, a to increase productivity in the workplace. Balances various aspects of a project, most of them complex issues such as architecture and system dynamics.



Management Information Systems: What do you study?

The major in management information systems prepares students for opportunities in the information technology field and business. Aimed at producing graduates who bridge the gap between technical knowledge and business functions, the program focuses on a mix of applied computer systems content, interpersonal interaction, and a practical business orientation.

Required Coursework

- Systems Analysis and Design
- Database Design and Implementation
- Visual Basic Database Programming for Business
- Introduction to Programming for Business in C#

This major requires Math Analysis I and II and Stat 201





Management Information Systems:

What can you do?

Students in this major study how organizations of all kinds can use these systems and the data they generate to make better decisions. The field overlaps with computer science and information technology, but is unique in its focus on how people interact with IT systems.

MIS majors' careers include:

- **Computer Systems Administrator** - Oversees the day-to-day operations of an organization's computer and network systems. They install, monitor, and organize wide area networks (WANs), local area networks (LANs), intranets, and other data communication processes.
- **Search Engine Optimization Specialist** - Support the work of businesses by reviewing, analyzing, and improving their websites. By maximizing web traffic, helps businesses reach new customers and increase profits.
- **Database Administrator** - Uses specialized software to store, protect, and organize data. Oversees all aspects of data administration, including database design, security, troubleshooting, and more.
- **Information Security Analyst** - reviews and analyzes organizations' various IT infrastructures to help protect them from security threats.
- **App Developer**
- **Software Engineer**



Computing and Security Technology

What do you study?

CST students learn to securely manage and operate IT infrastructure. Computer security majors tend to be hands-on and like to master the technical details to make complex systems work smoothly and securely.

Students must choose one of two concentrations: Computing Technology or Computing Security.

Required coursework includes:

- Network Administration I
- Introduction to Data Science
- Computer Programming I
- Introduction to Computing and Security Technology

Students must take the Math Analysis I and II and STAT 201.



Computing and Security Technology

What can you do?

A degree in computing and security technology opens the door to a wide range of exciting job opportunities with high potential for professional growth. Examples of computing and security technology jobs include:

- **Computer security technician** - also known as an IT security technician or network security technician, is diagnoses issues and provides software and hardware that protects against vulnerabilities to data breaches, hacking, and other cyberattacks.
- **Information security analyst** - plans and carries out security measures to protect an organization's computer networks and systems.
- **IT auditor** – examines internal controls and procedures to determine methods of improving efficiency, organization, and regulatory compliance. Much of this job revolves around compiling and interpreting data.
- **Network security analyst** - monitors for unusual activity and responds accordingly in order to protect against cyberattacks.



Data Science

What do you study?

With the explosive growth of large-scale data sources in today's technology-driven world, data science can provide the unique insights for science, business and social good. Data science majors tend to be good with quantitative analysis and like making sense out of data and presenting useful information in ways that other can understand.

The Data Science major focuses on how to create novel information products, develop new insights about people's behavior and solve problems that require large and disparate datasets, in domains such as health care, finance, research and development, and business operations.

Coursework includes data mining, information retrieval, visual analytics, social media trend spotting, human-computer interaction and information policy;

Required Coursework:

- Data Curation
- Data Science Programming I
- Exploratory Data Analytics

Students can opt for either Math Analysis I and II or Calculus I and II and must take Math 180 and Stat 201 and Stat 202



Data Science

What can you do?

CST students learn to securely manage and operate IT infrastructure. Computer security majors tend to be hands-on and like to master the technical details to make complex systems work smoothly and securely.

Careers include:

- **Data Scientist** - collects, cleans and munges data to meet the company's purpose. Duties may include experimental frameworks for product development and machine learning with the aim to lay a strong data foundation for robust analytics to be performed.
- **Business Intelligence Officer** - launches new hardware and software. Creates policies and procedures regarding collating and analyzing data. Critically evaluates and screens data; Develops new data analysis processes.
- **Information Architect** - plans and designs the information structure for websites and web applications. Organizes information and design strategies using data from usability testing on how users interact with a company's communications system.
- **Usability Analyst** - Analyzes user interfaces and workflows to identify opportunities for improvement. Conducts testing for design concepts and user experience. Reports test findings to the development and UX teams. Provides recommendations based on findings to improve interface designs.



Game Design and Production

What do you study?

Note: This major is in the Westphal College of Media Arts and Design and is oversubscribed. You would have to get permission from the department head to be considered for this major. You would also need a portfolio. This major does not offer a no co-op option.

Students develop a strong comprehension of animation and interactivity, along with an understanding of design and programming.

Students pursue a foundation of design and technology, taking core courses in all aspects of digital media

Coursework includes:

- Design I for Media
- Introductory Drawing
- Computer Graphics Imagery I
- Digital Storytelling

The only math course required for this major is Math Analysis I



Game Design and Production

What can you do?

A degree in game design and development can be the key to an exciting career in the video game industry. Here are a few of the top game design jobs within your field:

- **Graphic Designer** - creates visual concepts, using computer software or by hand, to communicate ideas that inspire, inform, and captivate consumers. They develop the overall layout and production design for applications such as advertisements, brochures, magazines, and report
- **Multimedia Artists and Animator** - creates two- and three-dimensional models and animation, images that appear to move, and visual effects for television, movies, video games, and other forms of media.
- **Information Security Analysts/Web Developers/Computer Network Architects**
- **Software Developers**



Interactive Digital Media

What do you study?

Note: This major is in the Westphal College of Media Arts and Design. If this is a major you are considering, we need to know early so that we can build you a schedule with the specific courses the degree requires. There is not a direct pathway to this major. Without proper planning, your graduation could be delayed.

IDM combines principles from a range of disciplines, giving you the tools not only to understand technology but also the human principles underpinning it. You'll get exposure to:

User Experience Design (UX) —Researching and advocating for the needs of people who will be using technologies, prototyping digital products, and working with agile methodologies

User Interface and Interaction Design —Using tools like Adobe Creative Suite to create visual experiences for technology products

Development —Programming the code (HTML/CSS, JavaScript, PHP/MySQL, etc.) that makes products work in a variety of media (websites, apps, augmented and virtual reality, Internet of Things, etc.)

Information Architecture (IA) and Content Strategy —Organizing and planning information systems for digital products

Project Management —Managing workflows to keep yourself and teams on track

The only math course required for this major is Math for Design



Interactive Digital Media

What can you do?

A degree in game design and development can be the key to an exciting career in the video game industry. Here are a few of the top game design jobs within your field:

- **Interactive media specialist** - writes, modifies, integrates and tests computer code for Internet applications, computer-based software, games, film, video and other interactive media. Uses various tools and computer languages to create the product.
- **Digital Marketing Specialist** - oversees digital activities across social, search, web, leadgen, PR tracking and display platforms. Manages the planning, execution, optimization and reporting of paid digital media campaigns. In cooperation with cross-functional teams, this person will be integral to ensuring that integrated digital strategies inform/convert to lead/score lead performance for the organization.
- **Web developer** - work independently as freelancers or with company teams to create websites. Depending on the job, these professionals may focus on front-end development, which involves designing sites and producing content, or back-end development, which involves writing code to make website features work.



Virtual Reality and Immersive Media

What do you study?

Note: This major is in the Westphal College of Media Arts and Design. If this is a major you are considering, we need to know early so that we can build you a schedule with the specific courses the degree requires. There is not a direct pathway to this major. Without proper planning, your graduation could be delayed.

This degree equips students with the technical and creative skills needed for the cutting-edge field of immersive media. Students learn universal principles of storytelling, animation and design and effective ways to leverage them with the latest technologies including 3D modeling, ray-traced rendering, use of interactive game engines while using the latest hardware and software for VR, AR, Motion Capture, Projection and other technologies

Coursework includes

- Augmented Reality
- Screenwriting
- Immersive Projection
- Computer Programming
- Digital Imaging
- Visual Effects

The only required math course is Math Analysis I



Virtual Reality and Immersive Media

What can you do?

A degree in game design and development can be the key to an exciting career in the video game industry. Here are a few of the top game design jobs within your field:

- **Content producer** - Content production is the process of developing and creating visual or written assets, such as videos, eBooks, blog posts, whitepapers, or infographics. The term might be useful in a broad sense, but the reality is that the details of content production vary wildly depending on the type of content.
- Software engineer
- **Product management** - Leads, the ideation, technical development and launch of the next generation of **Virtual Reality Software Developer** - develops new software and builds features that make disparate extended reality tools work together. Works with both software and hardware components of **VR/AR/mixed** reality products.
- **User interface and User experience designers** - work together to make sure that every page and every step a user will experience in their interaction with the finished product will conform to the overall vision created by UX designers.



Computer Engineering

What do you study?

Computer engineers design smaller, faster, and more reliable computers and digital systems, build computer networks to transfer data, embed microprocessors in larger physical systems such as cars and planes, work on theoretical issues in computing, and design large-scale software systems. Computer engineers may work in positions that apply computers in control systems, digital signal processing, telecommunications, and power systems, and may design very large-scale integration (VLSI).

The major provides a broad focus on electronic circuits and systems, computer architecture, computer networking, embedded systems, programming and system software, algorithms, and computer security.

Required Courses include:

Foundations of Electric Circuits I

Data Structures

Computer Organization & Architecture

Introduction to Computer Networks

Students take a full year of Calculus and 4 additional math courses



Computer Engineering

What can you do?

Computer engineering is an interdisciplinary field of study, one that combines electrical engineering and computer science disciplines into a specialized professional area of practice.

Possible jobs include:

- **Product Development and Advancement** - computer engineers are needed to develop and create computer systems in products like smart appliances, video game consoles, and cars. Companies who make these products are always working toward coming up with better designs that have more capabilities than the ones that came before them, which means they will need computer engineers to keep coming up with newer and better designs for the computers inside those products.
- **Database Engineer** - data collection, storage, and management is now done by most organizations for a variety of reasons. Database engineers build the systems that store this data and make it easy to retrieve and use when needed. New storage technologies have given database engineers plenty to work with when designing data management solutions, and the field is expected to grow 11 percent by 2024 to accommodate these needs.
- **Computer Architects** – designs and develops new, more powerful computing systems.
- **Robotics** - Designing and developing robotic systems used in a variety of industries (e.g. industrial production).



Engineering Technology

What do you study?

Engineering Technology offers several concentrations, and students interested in a hands-on engineering major can opt to student engineering technology with a concentration in electrical engineering and a minor in CS.

Engineering Technology is a branch of engineering that emphasizes practice and the application of theory to solve real-world problems. Although the subject areas of core courses in both engineering technology and traditional engineering are similar, engineering technology courses stress the application of engineering techniques, while traditional engineering courses focus on the development of concepts.

Required Courses include:

Circuit Analysis I

Digital Electronics

Microprocessors

Students take a Precalculus, Calculus I and II and Stat 201.



DREXEL UNIVERSITY

First-Year Exploratory Studies

Engineering Technology

What can you do?

You can do all the same things a Computer Engineer can do!

Possible jobs include:

- Product Development and Advancement
- Database Engineer
- Computer Architects
- Robotics





Criminology and Justice: What can you study?

Concentrations:

Justice Informatics

The program draws from criminology and criminal justice, and computing and informatics, to produce technologically proficient graduates who can solve problems created by crime. Students learn how to collect, manage, visualize, and analyze information.

Coursework includes Database Management Systems, Computer Investigation and the Law, Introduction to Computer Crime, Introduction to Data Science, Introduction to Informatics, Social Media Trend Spotting



Criminology and Justice: What can you do?

Have you ever wondered how to become an intelligence analyst, or get a job with federal agencies like the FBI or CIA? A degree in criminology can help prepare you for intelligence analyst jobs and other careers in the public sector. Below are just a few examples of criminology degree jobs:

- **Federal intelligence analysts** - help law enforcement agencies reduce crime by identifying patterns in criminal activity.
- **Forensic analysts** - collect and analyze evidence — from digital artifacts and more — in criminal investigations.
- **Fraud investigators** - gather information about potential fraud cases, such as insurance and credit card fraud.
- **Compliance officers** - investigate businesses to ensure that they are in compliance with federal and state laws.
- **GIS developers** - create and update web-mapping applications to improve a company's geo-processing abilities.



Mathematics

What do you study?

A degree in Mathematics provides theory and training in both applied and core mathematics. We offer both a BS and a BA in Math.

A **BS in Mathematics** provides broad knowledge of mathematics topics with depth in certain areas, while a **BA in Mathematics** provides a solid mathematics core within a flexible curriculum.

The BA in Math provides a strong general mathematics background while allowing students to create a program tailored to their interests. This is extremely useful for students pursuing careers in teaching or in the actuarial profession. The BA offers lots of free electives, allowing students to add a second major and take courses related to math in fields such as science, economics, finance, computer science or engineering.

The BS in Math emphasizes computing and mathematical modeling because these two areas give our students a competitive advantage when beginning their careers.



Mathematics

What can you do?

Forbes regularly ranks mathematics on its lists of top majors, while CareerCast's 2018 Jobs Rated Report — which rates jobs based on income, growth outlook, work environment and stress — listed six mathematics-related roles among its top 10 careers. Careers include

Actuarial Science - Actuaries use statistics and financial modeling to estimate risk in business, helping to protect company assets and mitigate the financial impact of natural disasters.

Computer Science - There is a high demand for software developers, engineers and computer scientists at some of the world's most influential companies. With its emphasis on computing, math majors are prepared for these types of roles.

Data Analysis - Data-driven companies across all industries fund entry-level mathematics jobs to draw insights from the information at their disposal. Data analyst specializations can range from business intelligence to market research, sales and even fraud investigation.

Education - Career opportunities in math exist at every educational level, from research-intensive positions at colleges and universities to private tutoring and high school teaching roles.

Finance - Students who dream of working on Wall Street fare well with a math degree. The math major is also excellent preparation for a variety of business careers, such as positions in consulting, underwriting and accounting.

Government and Law - The federal government and related agencies have a strong demand for the professional skills provided by a math degree, particularly in the areas of defense, criminal justice and space science. Math major careers include positions as cryptanalysts, statisticians and aerospace engineers.



Physics

What do you study?

The Physics program provides a solid foundation in physics suitable for graduate study or as preparation for other scientific or technical disciplines.

The coursework is divided into three categories:

Core courses Sample of courses **required:**

Computational Physics I

Classical Mechanics I

Electromagnetic Fields I

Methods courses, focusing on techniques in experimental, computational, or mathematical physics. **Options Include:**

Partial Differential Equations

Abstract Algebra I

Topics in Mathematical Physics

Subject courses. Options Include:

Introductory Astrophysics

Introduction to Nuclear Physics

Particle Physics



Physics

What can you do?

A Physics degree could prepare you for an enormous range of careers in the sciences and beyond, from mechanical engineering, climatology, and meteorology to aeronautics, military development, and public research. When paired with a secondary degree, a degree in physics could also help prepare you for a career in business, healthcare administration, information technology.

- **Computational Programmer** – Figure out the process of designing, writing, testing, debugging/troubleshooting and maintaining the source code of computer programs
- **Project Manager** - has the overall responsibility for the successful initiation, planning, design, execution, monitoring, controlling and closure of a project.
- **Software Developer** – they are the creative, brainstorming masterminds behind computer programs of all sorts.
- **Health Physicist**- A health physicist monitors and inspects workplaces that use radioactive materials



DREXEL UNIVERSITY

First-Year Exploratory Studies

A final thought Minors

With any of these majors, there are plenty of minors to supplement your degree to bolster what you do after!

Minors include:

- Computer Science
- Computing Technology
- Computer Engineering
- Digital Media
- Interactive Digital Media
- Data Science
- Computer Crime
- Information Systems
- Human Computer Interaction
- Management Information Systems
- Security Technology