# Game Development

## Associate in Applied Science Degree - Game Development

The Game Development degree offers students interested in the computer game and simulation fields a solid background in the foundations of hardware/software, programming, systems analysis and design, data structures and algorithms, advanced math, physics, and animation. Specialized courses in game design, critical game play, game programming and game production provide students with relevant skills and experience with industry standard tools and techniques. Students create a game design, build game programs using a popular game engine, and, in a capstone course, produce a working game with a team of student developers and artists.

## Articulation Agreements

Students should check with the Transfer Office about articulation agreements for these options and visit the New Jersey Transfer (http://www.njtransfer.org) website.

For more information, visit the Department of Information Technologies (http://www.ccm.edu/academics/divdep/bmet/department-of-information-technologies/) website.

## Degrees

**General Education Foundation**

| Communication | | 6 |
|---|---|---|
| ENG-111 | English Composition I | |
| ENG-112 | English Composition II | |
| Math-Science-Technology | | 4 |
| MAT-123 | Precalculus | |
| Humanities | | 3 |
| Choose from General Education course list | | |
| General Education Electives | | 11 |
| PSY-113 | General Psychology | |
| or ECO-21· | Principles of Economics I Macroeconomics | |
| Mathematics Elective | | |
| Laboratory Science Elective | | |
| General Education Foundation Credits | | 24 |
| **Game Development Core** | | |
| CMP-108 | Game Design Concepts | 3 |
| CMP-149 | Critical Game Play | 3 |
| CMP-128 | Computer Science I | 3 |
| CMP-129 | Computer Science II | 3 |
| CMP-150 | Game Programming | 3 |
| CMP-233 | Data Structures and Algorithms | 3 |
| CMP-250 | Game Production | 3 |
| CMP-280 | Software Engineering | 3 |
| MED-220 | Animation | 3 |
| COM-114 | Media Aesthetics | 3 |
| Select one or both of the following: | | 6 |
| Computer Information Systems | | |
| MED Electives | | |
| Game Development Core Credits | | 36 |
| **Total Credits** | | **60** |

## Faculty

Colleen Bamford
Chairperson, Associate Professor, Information Technologies
M.S., Nova Southeastern University
B.S., SUNY College at Brockport
EH 227  973-328-5669   cbamford@ccm.edu

Nancy Binowski
Professor, Information Technologies
M.S., Courant Institute of Mathematics, New York University
B.A., Rutgers University
EH 225   973-328-5775   nbinowski@ccm.edu

Colleen Carmeli
Assistant Professor, Information Technologies
M.S., Stern School of Business, New York University
B.A Hofstra University
EH 201   973-328-5773   ccarmeli@ccm.edu (CCarmeli@ccm.edu)

Al Elbanna
Associate Professor, Information Technologies
M.S., American Military University
B.A., American Military University
EH 221  973-328-5799   aelbanna@ccm.edu

Dawn Rywalt
Associate Professor, Information Technologies
M.S., Stevens Institute of Technology
B.S., Stevens Institute of Technology
CH 276  973-328-5783   drywalt@ccm.edu (DRywalt@ccm.edu)

Vickram Sawh
Assistant Professor, Information Technologies
M.S., New Jersey Institute of Technology
B.S., Jersey City State College
EH 201   973-328-5772   vsawh@ccm.edu

Michael Sidaras-Tirrito
Associate Professor, Information Technologies
M.S., Pace University
B.S., Pace University
EH 221   973-328-5793   mtirrito@ccm.edu

Stephen Stoll
Assistant Professor, Information Technologies
M.B.A, Seton Hall University
B.S., The Ohio State University
EH 201   973-328-5289   sstoll@ccm.edu

# Courses

**CMP-101. Computer Information Literacy. 1 Credit.**
LAB 30 hrs
This general education course provides students with an introduction to basic computer concepts that include learning the fundamentals of Windows, accessing the Internet and using Microsoft Word. Not for Information Technologies Department majors.
**Additional Fees:** Course fee applies.

**CMP-108. Game Design Concepts. 3 Credits.**
LECT 45 hrs
This course provides the student with an introduction to fundamental game design concepts. The range of topics includes game worlds and settings, character creation, storytelling, game audio, game art and animation, gameplay and user interface design. In addition, the history of the game industry, social impact and the future of gaming are discussed. Students analyze various games and genres and create their own game design document.
**Additional Fees:** Course fee applies.

**CMP-120. Foundations of Information Security. 3 Credits.**
LECT 45 hrs
This course provides a principled introduction to the field of information security. History, characteristics and models of information and computer security are explored. Topics such as risk management, logical and physical security, continuity, cryptography, and architecture are discussed. The National Centers of Academic Excellence in Cyber Defense Education Knowledge Units and the CISSP CBK domains are incorporated into the course content affording the student reinforcement and mastery of information security terminology and concepts.
**Additional Fees:** Course fee applies.

**CMP-124. Network Security. 3 Credits.**
LECT 45 hrs
This course provides an in-depth study of network attack techniques and methods to defend against them. Areas of study include communication security, infrastructure security, cryptography, and operational and organizational security as it relates to network hardware, software and data. Topics include authentication, attacks, virtual private networks, email protection, web security, wireless, firewalls, intrusion detection, cryptography, disaster recovery and computer forensics regarding networked systems. Using a hands-on approach, powerful tools to diagnose and correct security breaches are investigated and manipulated. This course is mapped to the National Centers of Academic Excellence in Cyber Defense Education Knowledge Units and vendor-neutral certification exam.
**Additional Fees:** Course fee applies.

**CMP-125. Information Security Management. 3 Credits.**
LECT 45 hrs
This course entails identifying an organization's information assets and the development, documentation and implementation of policies, standards, procedures and guidelines that ensure confidentiality, integrity and availability of those assets. This course, which is mapped to the National Centers of Academic Excellence in Cyber Defense Education Knowledge Units, prepares students to understand the planning, organization and roles of individuals involved in security, to develop security policies, and to utilize management tools to identify threats, classify assets and rate vulnerabilities. A detailed, real-world security plan is developed using customized strategies.
**Additional Fees:** Course fee applies.

**CMP-126. Computer Technology and Applications. 4 Credits.**
LECT 45 hrs LAB 30 hrs
This general education course teaches: (1) basic computer-use concepts such as hardware and peripherals, file organization and management, and operating system use; (2) Internet use, browsers and search engines; (3) software applications including word processing, spreadsheet, electronic slideshow presentations, database use and calendaring; (4) netiquette, ethics and copyright policies; (5) downloading and installing software and plug-ins; (6) communications technologies including email, blogs and Web technologies; (7) personal computer and information security; and (8) career exploration, job search strategies and portfolio development. Students are required to complete a series of laboratory assignments that illustrate skills and use technologies in the areas listed including a cross-applications/technologies project. Not for Information Technologies Department majors. Students will not receive credit towards graduation for more than one of the following courses: CMP-126, CMP-135, or BUS-119.
**Additional Fees:** Course fee applies.

**CMP-128. Computer Science I. 3 Credits.**
LECT 30 hrs LAB 30 hrs
In this introductory course, students obtain fundamental computer science knowledge and develop programming skills using an object-oriented approach, incorporating security awareness,human-computer interactions and social responsibility. This course provides students with a basic foundation in computing history, computing careers, computer organization, operating system responsibilities, software development process, algorithm design and analysis, programming paradigms, and human interaction design.
**Prerequisites:** MAT-007 or equivalent
**Additional Fees:** Course fee applies.

**CMP-129. Computer Science II. 3 Credits.**
LECT 30 hrs LAB 30 hrs
This course is the second in a three-course sequence that provides students with a foundation in Computer Science. Students develop intermediate-level programming skills using an object-oriented approach with an emphasis on software development, fundamental algorithms and data structures, software assurance, and ethical conduct.
**Prerequisites:** CMP-128 or equivalent
**Additional Fees:** Course fee applies.

**CMP-130. Introduction to Information Technology. 3 Credits.**
LECT 30 hrs LAB 30 hrs
This is the introductory course in the field of study of Information Technology. This course introduces the student to the software and hardware found in today's computing environment and the basic skills and tools required to install, support, and upgrade common information technology used by businesses, organizations and academic institutions. This is one of three courses that helps the student prepare for the CompTIA A+ certification examination. In addition, the basics of network architecture, database management, information security and web infrastructure are covered. At completion, the student will be prepared for further study in the curriculum of Information Technology and equipped with the fundamental knowledge required of an IT Professional. The students use popular desktop applications to organize and perform IT laboratory activities.
**Additional Fees:** Course fee applies.

**CMP-131. Fundamentals of Programming (Python). 3 Credits.**
LECT 30 hrs LAB 30 hrs
This is a fundamental course in problem solving and programming. This course introduces concepts such as how to solve problems by designing and implementing algorithms using a popular programming language. Topics include: pseudocode, algorithms, variables, constants, using decisions and loop structures to construct effective code, using built-in functions, creating functions and modules, and simple debugging techniques for detecting errors. Use of real-world problems in Web Development, Cybersecurity and Data Science are explored. No prior programming experience is required.
**Additional Fees:** Course fee applies.

**CMP-135. Computer Concepts With Applications. 3 Credits.**
LECT 30 hrs LAB 30 hrs
This general education course is designed to provide familiarity with current software for word processing, spreadsheet, presentation and database applications. An introduction to web browsers, computer and information security, social impact of computing, concepts in computer hardware, and application and system software is also included. Students are required to complete a series of laboratory assignments that illustrate skills in using the above software applications. Students must allocate time to complete assignments using the same software (available on campus). Not for Computer Information Systems majors. Students will not receive credit towards graduation for more than one of the following courses: CMP-135, CMP-126 or BUS-119.
**Additional Fees:** Course fee applies.

**CMP-149. Critical Game Play. 3 Credits.**
LECT 30 hrs LAB 15 hrs
This is an introductory course designed to increase games literacy and foster a shared understanding of the history of games, culturally and aesthetically. A thorough knowledge of the games that have shaped this industry is integral for all students considering entering the field. The class covers a wide spectrum of digital and analogue games. Students will take part in discussions and lectures.They will compose a short analyses of different games and justify their stances in group-wide presentations. The primary activity of the class is critical play - playing games and analyzing them in order to better understand the medium on a personal and professional level.
**Additional Fees:** Course fee applies.

**CMP-150. Game Programming. 3 Credits.**
LECT 30 hrs LAB 30 hrs
This course covers fundamental game programming techniques using an industry-standard scripting language. Students learn how to use a popular game engine to build game programs. Topics include sprites, animation, collisions, timers, game state variables, player input, audio, user interface design and storyboarding. Laboratory work includes several game element programming exercises,leading up to a final game project.
**Prerequisites:** CMP-128 or equivalent
**Additional Fees:** Course fee applies.

**CMP-160. Digital Forensics I. 3 Credits.**
LECT 30 hrs LAB 30 hrs
This course introduces the student to the fundamental concepts of computer forensics. By conducting a detailed examination of data media for structure, file system type, volumes, lost and hidden areas, the student will develop the ability to collect and analyze computer data for digital evidence. An understanding of specific resources and an exploration of software tools available for data recovery and forensic analysis will be conducted in a laboratory setting. Upon completion of this coursed the student will demonstrate various data recovery techniques as the basis for forensic evaluation.
**Additional Fees:** Course fee applies.

**CMP-170. Mobile App Design. 3 Credits.**
LECT 30 hrs LAB 30 hrs
This course introduces students to the design and development of mobile applications. Students will learn how to install and use a leading mobile app software development kit, design the user interfaces using different design patterns, create and edit app resources, and design and develop native source code. Students will strengthen their programming skills in user input, variables, operations, decision control structures, methods, lists and arrays. Audio, images, animation and other application controls will be incorporated into apps. Other topics include testing, deployment and publishing apps.
**Prerequisites:** CMP-128
**Additional Fees:** Course fee applies.

**CMP-200. Computer Operating Systems and Utilities. 3 Credits.**
LECT 45 hrs LAB 15 hrs
This is an introductory course in personal computer operating systems. Topics include the features and characteristics of operating system software; installation and configuration including customization, file organization and management; memory and storage management; control of peripheral devices; troubleshooting; networking wizards; and the use of utilities to monitor system performance, backup data and optimize disks. Laboratory assignments provide hands-on opportunities for students to apply the information related in lectures.
**Additional Fees:** Course fee applies.

**CMP-230. Computer Architecture and Assembly Language. 3 Credits.**
LECT 45 hrs LAB 15 hrs
This course is an introduction to computer architecture and assembly language programming. Topics covered include digital logic and data representation, computer architecture and organization, interfacing and input/output strategies, memory architecture, functional organization, and multiprocessing. Students are exposed to basic assembly language programming techniques in laboratory assignments.
**Prerequisites:** CMP-128 or equivalent
**Additional Fees:** Course fee applies.

**CMP-233. Data Structures and Algorithms. 3 Credits.**
LECT 45 hrs LAB 15 hrs
The course includes advanced computer science topics dealing with logical structures of data and the design and analysis of computer algorithms operating on these structures. The course concentrates on data structures such as linked lists, trees, queues, stacks, hash tables and graphs. Algorithms covered include stacks, queues, hash tables, trees, graphs,heaps, sorting and searching. Both iterative and recursive algorithms are explored with analysis of their efficiency. Problems and computer exercises implementing the above structures and techniques are assigned.
**Prerequisites:** CMP-129 or equivalent and MAT-123 or higher
**Additional Fees:** Course fee applies.

**CMP-239. The Internet and Web Page Design. 3 Credits.**
LECT 45 hrs LAB 15 hrs
This course is an in-depth study of the Internet and its various services that allows students to appreciate the impact of the Internet in society. Students create World Wide Web home pages using strict Hypertext Markup Language, Cascading Style Sheets (CSS) and XHTML. Other current specifications also are discussed.
**Additional Fees:** Course fee applies.

**CMP-241. Database Programming (SQL). 3 Credits.**
LECT 45 hrs LAB 15 hrs
This course uses the rules and syntax of an "industrial-strength" database programming language that can be used on all types of computers. Topics include relational database aspects, data input and validation, creation and maintenance of files, query, user control center, and application generator. Emphasis is on development of programs related to business database applications.
**Prerequisites:** CMP-128 or CMP-131 or permission of department chair
**Additional Fees:** Course fee applies.

**CMP-243. Ethical Hacking and Systems Defense. 3 Credits.**
LECT 30 hrs LAB 30 hrs
This course combines an ethical methodology with the hands-on application of security tools, techniques,and methodologies in performing computer system and network security vulnerability - risk analyses - to better help students secure and defend their systems. Topics to be covered include internal and external penetration tests, risk analysis methodology, and security audits. Students are introduced to common countermeasures that effectively reduce and/or mitigate attacks. This class is designed to help students prepare for professional careers in the information security field and the Certified Ethical Hacker (CEH)certification exam.
**Prerequisites:** CMP-124
**Additional Fees:** Course fee applies.

**CMP-244. Web Design II. 3 Credits.**
LECT 45 hrs LAB 15 hrs
This course is a continuation of The Internet and Web Page Design with an emphasis on more advanced concepts and techniques. Topics include Cascading Style Sheets, forms, JavaScript and other current scripting languages. Students learn to work with hosting and web server technology. For their final project, students build a website using these techniques.
**Prerequisites:** CMP-239
**Additional Fees:** Course fee applies.

**CMP-249. Advanced Web Programming. 3 Credits.**
LECT 30 hrs LAB 30 hrs
This advanced course in Web Development introduces the student to creating interactive and dynamic Web sites using current Web programming. Building on concepts and principles of computer programming and scripting languages, students will interact with Web server technologies and develop front end, advanced professional Web sites with fully functioning back end support.
**Prerequisites:** CMP-128 and CMP-244
**Additional Fees:** Course fee applies.

**CMP-250. Game Production. 3 Credits.**
LECT 30 hrs LAB 30 hrs
Working in teams, students combine their game design and programming skills to explore the practical challenges of managing the development of games. Industry-standard software and advanced programming are used in this capstone course to develop a functioning game of the highest professional quality. Emphasis is placed on the game design document, storyboarding, the game production process, user interface and game design, interactive storytelling, character development, 3D animation, special effects, audio, the collaborative process, and usability testing.
**Prerequisites:** CMP-150 or MED-220
**Additional Fees:** Course fee applies.

**CMP-255. Linux. 4 Credits.**
LECT 45 hrs LAB 30 hrs
This is a hands-on course in the administration of a Linux Operating System. Students utilize the command line interface to control the operating system and its utilities. Focus is placed on the file system, user system, file security, process and job management, X-Windows, shells and shell scripting. A POSIX-compliant shell, such as ash, dash, bash or ksh, is introduced. Concepts include redirection, piping, and regular expressions. Upon successful completion of this course, students are proficient in using the Linux operating system, with combined lecture and lab exercises focusing on basic/intermediate skills essential to an IT professional.
**Prerequisites:** CMP-128
**Additional Fees:** Course fee applies.

**CMP-261. Digital Forensics II. 3 Credits.**
LECT 30 hrs LAB 30 hrs
This advanced course in digital forensics will enable the student to understand advanced file system forensics, the theory of forensic procedures, review of identification, imaging, and authentication, review of FAT file system, NTFS and EXT3 file systems, partitioning, Window's logical analysis, email analysis, and web history analysis conducted in a laboratory setting. Upon completion of this course the student will apply investigative methodology as it applies to data artifacts, including where they are found in computer operating systems, and how they are deployed in digital forensics. The student will perform forensic media acquisition and verification.
**Prerequisites:** CMP-160
**Additional Fees:** Course fee applies.

**CMP-262. Data Science Programming. 3 Credits.**
LECT 30 hrs LAB 30 hrs
This course covers problem solving strategies and programming techniques specific to data analytics using an industry-standard, general-purpose programming language and tool set. Students will learn how to gather input from structured and unstructured sources of various formats, stored locally and remotely through cloud computing, and use programming libraries and application programming interfaces to efficiently process data and present information. Team and individual projects will analyze real-world, large datasets. Data integrity, privacy and security will be considered.
**Prerequisites:** CMP-131 Fundamentals of Programming (Python) or approval of IT Department Chairperson
**Additional Fees:** Course fee applies.

**CMP-263. Web Development Workflow. 4 Credits.**
LECT 45 hrs LAB 30 hrs
This course provides students with cutting edge Web development skills to create and maintain Web sites that are modern, responsive, and dynamically delivered across a wide range of devices. Students learn leading Web design and development tools including current industry standard Web interactive tools, Git, JQuery Framework, and content management systems. Instruction and practice on available platforms provide seamless integration and unified interface across all tools to streamline Web development from local development to staging to production. Students will develop competence in the use of industry-leading development tools in building a current, engaging, and dynamic Web site.
**Prerequisites:** CMP-239 or MED-110 or GRD-108
**Additional Fees:** Course fee applies.

**CMP-264. Machine Learning. 3 Credits.**
LECT 15 hrs LAB 60 hrs
This course provides a practical understanding and foundational principles of Machine Learning techniques. It offers the concepts, the intuitions, and the tools the students need to implement programs capable of learning from data. A large number of techniques are covered, from supervised learning algorithms, unsupervised learning algorithms to Deep Learning techniques and applications. The main goal of this course is to equip students with the skills to tackle real Machine Learning problems encountered in real life and business and establish a project portfolio
**Prerequisites:** MAT-114 AND CMP-131, OR Equivalent AND Department Permission
**Additional Fees:** Course fee applies.

**CMP-271. Mobile App Programming. 3 Credits.**
LECT 30 hrs LAB 30 hrs
This second course in a series of mobile app development courses covers advanced design elements and programming constructs. Topics include accessing device resources including the camera, accelerometer, and GPS; utilizing local and networked database services; animation and gaming; accessing background services; file management; designing for multiple devices including wearables; and localization/internationalization and accessibility design. Students will create apps individually and as part of a team and their learning will culminate with the development of a final project that will be of industry-level quality.
**Prerequisites:** CMP-170
**Additional Fees:** Course fee applies.

**CMP-280. Software Engineering. 3 Credits.**
LECT 30 hrs LAB 30 hrs
Software engineering practices are examined in the context of the system development life cycle, comparing traditional structured approach and the object-oriented approach, with the main focus on object-oriented approach. Topics include user stories, use cases, object-oriented modeling, comprehensive project management, the Unified Modeling Language (UML) diagrams, Agile techniques, and user-interface design. Class projects provide students with practice in developing soft skills necessary to work as part of a team. Students participate in a semester-long team project to design an application using system analysis and design techniques.
**Prerequisites:** CMP-128 and one of the following: CMP-129, CMP-150, or CMP-241
**Additional Fees:** Course fee applies.

**CMP-290. Independent Study in Information Technology. 3 Credits.**
LECT 45 hrs
Students, in consultation with the department chair, undertake an in-depth analysis of a selected topic, problem or issue related to information technology or pursue additional computer-related work experience. Students are responsible for developing a statement of goals and strategies, maintaining a weekly log, and preparing a written and oral summary report. Computer Information Systems majors only.
**Prerequisites:** Permission of department chair
**Additional Fees:** Course fee applies.

**MED-110. Multimedia I. 3 Credits.**
LECT 45 hrs
Multimedia I is a survey course designed to allow students to explore, discuss, develop and use multimedia technology.This computer-based course offers an extensive overview of the technologies of multimedia. Students engage in issues related to usability, management and distribution.Topics include multimedia development and design, media elements, and emerging hardware and software trends. Several projects throughout the course give students hands-on experience with a variety of digital multimedia tools.
**Additional Fees:** Course fee applies.

**MED-113. Multimedia II. 3 Credits.**
LECT 45 hrs
An advanced course designed to allow students to apply the theory and basic practical knowledge presented in Multimedia I. Students apply their knowledge productions for DVD, local networks or the Internet. Students incorporate traditional media production elements such as video and audio combined with the latest features and technologies. Conceptualization, user interface design and prototyping are key course elements. A multimedia prototype project that demonstrates conceptual and technical understanding is required.
**Prerequisites:** MED-110
**Additional Fees:** Course fee applies.

**MED-119. Digital Media Production. 3 Credits.**
LECT 45 hrs
This course provides students with theory and training in the area of digital content development for digital media productions. Software and hardware training in digital video, audio, animation and graphics are introduced. In addition, the appropriate use of these areas of content in developing digital media productions and interface design are discussed.
**Additional Fees:** Course fee applies.

**MED-210. Digital Video Editing. 3 Credits.**
LECT 30 hrs LAB 30 hrs
Through hands-on learning, Digital Video Editing provides students with the fundamental principles of video editing with a focus on the techniques and technology used to achieve a superior final product. An in-depth exploration of non-linear editing concepts includes a deeper understanding of primary, secondary and tertiary motion, shot types, sequencing, transitions and continuity. Students learn to log and capture raw video, assemble shots on a timeline, create, add, and edit text, audio tracks, title animation, effects, transitions, continuity and video compositing. This course is ideal for students who wish to create and edit a professional video for broadcast, webcast and other motion media venues.
**Prerequisites:** MED-113 or MED-211 or COM-211
**Additional Fees:** Course fee applies.

**MED-213. Multimedia Authoring and Design. 3 Credits.**
LECT 45 hrs
Using industry-standard authoring software, students apply multimedia technology to assemble a real-world interactive multimedia project. Concepts and principles of user interface design, digital audio and video production, team production techniques and usability testing are employed. As members of a production team, students plan, manage and implement a complex multimedia production project to be used on DVD, a local network or the Internet for a participating business partner.
**Prerequisites:** MED-113
**Additional Fees:** Course fee applies.

**MED-220. Animation. 3 Credits.**
LECT 45 hrs
This is an advanced production course utilizing 3D modeling and animation software to create animated imagery for video and multimedia applications. Software includes 3D Studio Max (3D animation) and Adobe Premiere and AfterEffects (digital video). Through assigned projects, students learn to combine live video and animation with compositing and bluescreening techniques.
**Additional Fees:** Course fee applies.

**MED-240. Advanced Animation. 3 Credits.**
LECT 45 hrs
This advanced-level course is a continuation of MED-220 Animation and is designed to expose students to high-end 3-D modeling tools for digital animation, electronic post-production, digital special effects and digital multimedia. This course explores advanced applications in digital compositing, particle systems, Newtonian algorithms, kinemation, dynamation and 3-D characters.
**Prerequisites:** MED-220
**Additional Fees:** Course fee applies.