

## Program Requirements for a Dual Major in Mathematics and Web/ Mobile Informatics Hours: 79 hours

Mathematics Requirements - 34 hours	
MTH 191	Calculus I (3) MA
MTH 192	Calculus II (3) MA
MTH 220	Discrete Mathematics (3) MA
MTH 255	Introduction to Linear Algebra (3) MA
MTH 291	Calculus III (3) MA
MTH 292	Calculus IV (3) MA
MTH 301	Mathematical Modeling (3) MA
MTH 310	Differential Equations (3) MA
MTH 320	Probability and Statistics (4) MA
MTH 325	Numerical Analysis (3) MA
	<i>Choose one of the following courses:</i>
MTH 315	Number Theory (3) MA
MTH 361	Abstract Algebra (3) MA
Web/Mobile Informatics Requirements - 45 hours	
INF 120	Principles of Programming I (3)
INF 230	Database Design & Development (3)
INF 215	Principles of Human Computer Interaction (HCI) (3)
INF 221	Principles of Programming II (3)
INF 250	Web Fundamentals & Standards (3)
INF 270	Introduction to Mobile Application Development (3)
INF 331	Applied Database (3)
INF 255	Client-Side Scripting (3)
INF 256	Server-Side Scripting (3)
INF 328	Object Oriented Analysis & Design (3)
INF 355	Advanced Client-Side Scripting (3)
INF 356	Advanced Server-Side Scripting (3)
INF 450	Topics in Web/Mobile Development (3)
INF 396 or 496	Cooperative Education Work Experience: Parallel (3)
INF 400	Informatics Senior Research (1,1) (1 cr. per semester taken in two semesters)
INF 401	Informatics Capstone (1)

### Program/Learning Outcomes

Students who successfully complete the Mathematics and Web & Mobile Informatics Dual major will be able to:

1. Independently read and understand mathematics.
2. Demonstrate the processes in mathematics, methods of formal proof, problem solving techniques and strategies and applications of computers in mathematics.
3. Understand the branches of mathematics and how they are related.
4. Function effectively in a professional workplace related to mathematics, Web & Mobile Informatics or in a graduate program.
5. Demonstrate knowledge and skills in the logical foundations of informatics, data representation, models, structures and informatics-centric management.
6. Demonstrate skills necessary to design, implement, and maintain a complex web/mobile application development project using modern languages and integrated development environments.
7. Analyze issues ranging from storage, retrieval, and interpretation of information to the implementation and management of complex information systems used within web and mobile applications.
8. Evaluate how legal and ethical technology issues impact business activities including such areas as data access, privacy, confidentiality, security, and intellectual property standards and policies.
9. Demonstrate a personal learning strategy for continuing education and lifelong learning that is independent of employer sponsorship.

### **INF 101 Seminar – Introductory Informatics (1)**

**PREREQUISITES:** None

**COURSE DESCRIPTION:** Explore the many fields of Informatics, gaining basic understanding how information is collected, manipulated, classified, stored, retrieved, and visualized. This course includes an introduction to informatics and explores various career opportunities in informatics fields. There will be a variety of guest speakers to help navigate through the vast array of opportunities in informatics.

### **INF 110 Foundations in Technology (3)**

**PREREQUISITES:** None

**COURSE DESCRIPTION:** Want to make the computer work for you rather than frustrate you? Learn hands-on what you need to know about information technology. This course helps to demystify technology, enabling you to be more confident and self-sufficient using valuable technology tools. This foundations course: presents general file management and application management techniques; provides hands-on opportunity to learn more about your operating system, hardware, and network; expands your internet experience including building a personal website; introduces general programming concepts in a fun, interactive environment; provides opportunity to develop and enhance troubleshooting skills. Learn how technology can assist you with your career goals.

### **INF 120 Principles of Programming I (3)**

**PREREQUISITES:** INF 110 Foundations in Technology or equivalent

**COURSE DESCRIPTION:** Gain an understanding of the basic concepts and considerations of structured and object-oriented programming methodologies and be able to apply these concepts appropriately to solve a variety of typical problems, programming in an event-driven graphical development environment including creating classes and objects.

### **INF 215 Principles of Human Computer Interaction (HCI) (3)**

**PREREQUISITES:** INF 120 Principles of Programming I or equivalent

**COURSE DESCRIPTION** This course introduces the skills and concepts of Human-Computer Interaction (HCI) that enable developers to design systems that effectively meet human needs. Topics covered include Human-Computer Interaction, Human-Centered Design, Understanding Users, Design Methods, Usability and Evaluation, Prototyping, Collaboration Design, Observation Techniques, and Interview Techniques.

### **INF 218 Fundamentals of Search Analytics (3)**

**PREREQUISITES:** INF 230 Database Design & Development

**COURSE DESCRIPTION:** This course covers techniques and tools to automatically crawl, parse, index, store, and search information available via the web. This course also covers the problems of web searching and web navigation, how a search engine works, the different types of search engines, and web metrics and data mining.

### **INF 221 Principles of Programming II (3)**

**PREREQUISITES:** INF 120 Principles of Programming I or equivalent

**COURSE DESCRIPTION:** Develop programming techniques emphasizing reliability, maintainability, and reusability. This course includes an introduction to objects, classes, and object-oriented design, incorporating encapsulation, inheritance, polymorphism, and abstraction. Additional topics include systems development lifecycle (SDLC), multi-dimensional arrays, exception handling, addresses, pointers, and dynamic storage allocation.

### **INF 230 Database Design & Development (3)**

**PREREQUISITES:** INF 120 Principles of Programming I or equivalent (INF 372 Information Systems strongly recommended for Business Informatics and Health Science Informatics majors)

**COURSE DESCRIPTION:**

This course provides an introduction to fundamental database concepts including current relational database modeling, file management, data definition, and standards. Learn to develop structured query language (SQL) statements to develop, retrieve, manipulate, and maintain data. Use complex and compound criteria from multiple tables to develop appropriate reports and perform data analysis. Also explore some contemporary non-relational databases.

### **INF 240 Healthcare Informatics (3)**

**PREREQUISITES:** INF 110 or equivalent

**COURSE DESCRIPTION:** An introduction to the use of information technology in health care delivery, applications, decision-making, planning and research.

### **INF 250 Web Fundamentals & Standards (3)**

**PREREQUISITES:** INF 120 Principles of Programming I

**COURSE DESCRIPTION** This course is designed to provide students with the fundamentals of current and proposed standards for HTML, XHTML and CSS. This course also explores web technologies, examining future directions that present opportunities for multimedia developers, examines various multimedia formats (images, audio, video, sound and animation), web standards and accessibility.

### **INF 255 Client-Side Scripting(3)**

**PREREQUISITES:** INF 221 Principles of Programming II and INF 250 Web Fundamentals & Standards

**COURSE DESCRIPTION:** Introduction to the Document Object Model (DOM), fundamentals of Internet application design, development, and deployment using client-side scripting language(s) and the use of external libraries such as JQuery. Further examination of various multimedia formats (images, audio, video, sound and animation).

### **INF 256 Server-Side Scripting(3)**

**PREREQUISITES:** INF 221 Principles of Programming II and INF 250 Web Fundamentals & Standards

**COURSE DESCRIPTION:** This course covers the configuration of web server software and the use of server-side programming. Topics include: Server-side scripting in languages such as PHP and Java Server Pages, SQL, database access and drivers, security issues, including access control and secured transmissions.

### **INF 270 Introduction to Mobile Application Development (3)**

**PREREQUISITES:** INF 120 Principles of Programming I (INF 221 Principles of Programming II strongly recommended)

**COURSE DESCRIPTION:** In this course, students will be introduced to the foundations of mobile development and its unique requirements and constraints. Students will create a variety of mobile applications. Requirements and design decisions tied to mobile application development and how they relate to limited resources available on mobile devices are emphasized.

### **INF 324 Data Structures (3)**

**PREREQUISITES:** INF 221 Principles of Programming II

**COURSE DESCRIPTION:** In-depth study of the abstract data type: its theory and implementation, study of complex data structures including trees, B-trees and graphs.

### **INF 328 Object-Oriented Analysis & Design(3)**

**PREREQUISITES:** INF 221 Principles of Programming II

**COURSE DESCRIPTION:** This course covers techniques of abstraction and object design, design patterns, and object modeling and how to apply these concepts to web and mobile applications.

### **INF 331 Applied Database (3)**

**PREREQUISITES:** INF 230 Database Design & Development

**COURSE DESCRIPTION:** This course builds on the Database Design & Development course and focuses on the creation, administration and use of databases utilizing a multi-tier application design methodology. This course assumes knowledge of database system concepts. The student will be introduced to application program development in a database environment with emphasis on setting up, modifying, and querying a database. Students will also do extensive project work writing and utilizing database stored procedures and triggers.

### **INF 335 Data Analytics (3)**

**PREREQUISITES:** INF 230 Database Design & Development

**COURSE DESCRIPTION:**

Students will develop an understanding and application of business intelligence techniques while learning data mining and decision support fundamentals and gaining an understanding of data collection, cleaning and aggregation issues. Students learn to construct meaningful multi-dimensional models, investigate data warehousing issues, utilize a data mining query language, learn statistical techniques for analyzing data, utilize decision trees in data analysis, and investigate cluster analysis.

**INF 345 Accounting Information Systems (3)**

**PREREQUISITES:** ACC 345: ACC 301 and CIS 135 (Required) ;  
INF 345: ACC 213, CIS 135 (Required) and CIS 300/INF372 (Recommended)

**COURSE DESCRIPTION:** Focus for this course is on understanding how technology can enable key financial accounting activities. The student will be introduced to processing and reporting of accounting requirements using various types of computerized accounting systems. Risk assessment and evaluation techniques related to defining, implementing, and managing accounting information systems will be examined. Students will learn of the importance of integrating both manual and system controls to achieve reliable results.

**INF 348 Project Management (3)**

**PREREQUISITES:** Informatics Majors: INF 120 Principles of Programming I; Non-Informatics Majors: MGT 300, CIS 300/INF 372, BUS 352

**COURSE DESCRIPTION:** A comprehensive overview of the elements of modern project management, guidelines for success, and related tools. Dimensions and elements of project management, concepts, methodologies, strategies, and structures will be examined.

**INF 355 Advanced Client-Side Scripting(3)**

**PREREQUISITES:** INF 255 Client-Side Scripting

**COURSE DESCRIPTION:** This course covers the more advanced Object-Oriented features of a client-side scripting language as well as AJAX with XML and JSON. Open source libraries such as jQuery, JQuery Mobile, and Prototype are covered with an emphasis on developing plugins for these libraries.

**INF 356 Advanced Server-Side Scripting(3)**

**PREREQUISITES:** INF 256 Server-Side Scripting

**COURSE DESCRIPTION:** Advanced topics for scripting in a server-side programming language. Topics covered will include object-oriented web application frameworks , Model/View/Controller (MVC) design pattern, Content Management Systems (CMS), web services, XML Schemas, SOAP (Simple Object Access Model), WSDL (Web Services Description Language), authentication, authorization, session management, PDF generation and email communication.

**INF 372 Information Systems (3) - Cross-list with CIS 300 Business Information Systems**

**PREREQUISITES:** Informatics Majors: CIS 135, INF 120; Non-Informatics Majors: ACC 213, CIS 135, MGT 300

**COURSE DESCRIPTION:**

An introduction to the goals, components and development of all levels of information systems. The course includes hands-on use of microcomputer productivity software for management, communication and decision-making. Students use spreadsheets and database tools to perform what-if and sensitivity analysis, summarizing and reporting.

**INF 374 Technology Ethics and Security (3)**

**PREREQUISITES:** INF 110 Foundations in Technology

**COURSE DESCRIPTION:**

This course covers the management of information technology and the broader issues of morality, ethics, security, and policy. This course considers issues pertaining to data security, regulation, intellectual property, freedom of expression, social media, hacking, malware, technology-based crime, and appropriate use and dissemination of data.

**INF 376 Systems Analysis & Design (3)**

**PREREQUISITES:** INF 120 Principles of Programming I

**COURSE DESCRIPTION:** The theory and methods of analysis, design, and implementation of batch and interactive computer systems. Students will analyze and design information systems and/or evaluate commercial packages.

### **INF 390 Industry Informatics (3)**

**PREREQUISITES:** INF 110, CIS 135, or equivalent

**COURSE DESCRIPTION:** Students gain a competitive advantage by being well-versed with the industry standard tools within their discipline. In this course, students will choose a specific industry and/or discipline and research the various technology tools currently used while identifying industry leaders. Specific attention will require students to understand the technology platform used for the industry tools. Students will also investigate emerging technologies and how they are impacting a specific industry. Students will also gain hands-on experience with industry-specific technology tools.

### **INF 391 Topics in Technology (3)**

**PREREQUISITES:** INF 120 or equivalent and 2 other INF courses.

**COURSE DESCRIPTION:** Variable topic course with emphasis is on current trends in informatics that complement the specific informatics discipline of each student. Students develop specific learning outcomes and report on progress, prepare and deliver a training module for the class, and attend guest lectures from industry professionals. Researching and/or obtaining an industry-recognized certification is strongly encouraged. Course may be taken up to two times (total of 6 credit hours).

### **INF 400 Informatics Senior Research (2)**

**PREREQUISITES:** Senior status or permission of the instructor

**COURSE DESCRIPTION:** Students work independently mentored by a faculty advisor on a project that demonstrates and integrates knowledge attained through previous coursework.

### **INF 401 Informatics Capstone (1)**

**PREREQUISITES:** At least 40 credit hours within your specific Informatics major curriculum.

**COURSE DESCRIPTION:** The course provides a chance for exploration into the impact of informatics within your discipline on the world and vice-versa as well as a chance for personal reflection on the past and future impact of informatics and of a liberal arts education at the Mount.

### **INF 450 Topics in Web and Mobile Application Development (3)**

**PREREQUISITES:** INF 255 Client-Side Scripting and INF 270 Introduction to Mobile Application Development

**COURSE DESCRIPTION:** Explore emerging technologies in web and mobile software development. Understand the issues and concepts underlying new technology through hands-on experience, and become prepared for future developments in this quickly evolving field. This course may be repeated with new content. See class schedule for specific content.

### **CIS 135 Spreadsheets (3)**

**PREREQUISITES:** None

**COURSE DESCRIPTION:** Students progress from basic spreadsheet operations on microcomputers to more intermediate applications. Learn to efficiently produce worksheets. After mastering the basic features of creating, editing, and formatting a spreadsheet, students work with more advanced formulas and functions, perform what-if analyses, create graphs and databases, and work with macros.

### **MTH 220 Discrete Mathematics**

**PREREQUISITES:** Grade of "C" or better in MTH 191

**COURSE DESCRIPTION:** Propositional and predicate logic; methods of proof, induction; sequences, recursion, recurrence relations; set theory; functions and relations.

### **NURxxx Healthcare Policy (3)**

**PREREQUISITES:** TBD

#### **COURSE DESCRIPTION:**

The purpose of this course is for the student to gain a historical, political, economic, social, and financial perspective on the health care system in the United States.

Delivery of health care, health care policies, financing of health care, and health care reform will be discussed. Areas of exploration include: cost containment, managed care, social justice issues, legislative and regulatory controls, globalization and ethical/legal issues.