

**CISC P81/3.0**                      **Computers: Applications and Implications**                      **2L;1P**

Computers are changing our lives; this is a course for any student interested in learning about computing. It surveys many fields of computing science, presents case studies of fascinating examples of computers in use in diverse areas, from searching the world-wide web to medicine, and discusses the possibilities, limitations, and risks of computers.

ONE-WAY EXCLUSION: May not be taken with or after: CISC 124/3.0

**CISC P82/3.0**                      **Fundamentals of Web Applications**                      **3L**

This course surveys current best practices for implementing attractive, usable, secure and maintainable web applications. Other issues considered include: accessibility, platform and browser independence, licensing of intellectual property, scalability, and user privacy. This course is suitable for any student with some programming experience.

PREREQUISITE CISC 101/3.0 or CISC 110/3.0.

COREQUISITE CISC 121/3.0.

**CISC 101/3.0**                      **Elements of Computing Science**                      **3L;3P**

Introduction to algorithms: their definition, design, coding, and execution on computers. Intended for students who have no programming experience. All or most assignment work will be completed during lab time.

EXCLUSION No more than 3.0 units from CISC 101/3.0; CISC 110/3.0.

ONE-WAY EXCLUSION May not be taken with or after: CISC 121/3.0; CISC; SOFT at the 200-level and above.

**CISC 110/3.0**                      **Elementary Computer Animation**                      **3L;3P**

Introduction to tools and techniques for creating 2D computer animations. Introduction to animation software (e.g., Flash) and scripting languages (e.g., ActionScript). Involves a project in the student's area of interest, such as fine art, education, or commerce.

NOTE No computing or art background required.

NOTE Sufficient preparation for CISC 121.

EXCLUSION No more than 3.0 units from CISC 101/3.0; CISC 110/3.0.

ONE-WAY EXCLUSION May not be taken with or after: CISC 121/3.0.

**CISC 121/3.0**                      **Introduction to Computing Science I**                      **3L**

Introduction to design and analysis of algorithms. Recursion, backtracking, and exits. Sequences, linked lists and references. Binary search trees. Elementary searching and sorting. Assertions and loop invariants. Order-of-magnitude complexity. Numerical computation. Documentation, testing and debugging.

RECOMMENDATION Some programming experience (such as high-school level programming or CISC 101/3.0 or CISC 110/3.0); see Introductory Courses in Departmental Notes.

COREQUISITE MATH 111/6.0 or MATH 121/6.0 or MATH 122/6.0 or MATH 110/6.0 or MATH 112/3.0 or MATH 120/6.0 or MATH 123/3.0 or MATH 124/3.0 or MATH 126/6.0.

**CISC 124/3.0**                      **Introduction to Computing Science II**                      **3L;2T**

Introduction to object-oriented design, architecture, and programming. Use of packages, class libraries, and interfaces. Encapsulation and representational abstraction. Inheritance. Polymorphic programming. Exception handling. Iterators. Introduction to a class design notation. Applications in various areas.

PREREQUISITE CISC 121/3.0.

COREQUISITE MATH 111/6.0 or MATH 121/6.0 or MATH 122/6.0 or MATH 110/6.0 or MATH 112/3.0 or MATH 120/6.0 or MATH 123/3.0 or MATH 124/3.0 or MATH 126/6.0.

**CISC 203/3.0**                      **Discrete Mathematics for Computing Science**                      **3L**

Introduction to mathematical discourse and proof methods. Sets, functions, sequences, and relations. Properties of the integers. Introduction to graph theory. Introduction to combinatorics.

COREQUISITE CISC 121/3.0.

**CISC 204/3.0**                      **Logic for Computing Science**                      **3L**

Elements of mathematical logic with computing applications. Formal proof systems for propositional and predicate logic. Interpretations, validity, and satisfiability. Introduction to soundness, completeness and decidability.

PREREQUISITE CISC 203/3.0.

**CISC 220/3.0**                      **System-Level Programming**                      **3L;2P**  
Basic concepts of Unix-like systems. Shells and scripting. System-level programming in the C language. Software development tools and techniques.  
COREQUISITE   CISC 124/3.0.

**CISC 221/3.0**                      **Computer Architecture**                      **3L;2P**  
The descriptive levels of computer architecture. Instruction-set architectures. Assembly Language. Data representation. Support for operating-system management and high-level languages. Input/output and interrupts. Designing for performance. Digital Logic.  
RECOMMENDATION   CISC 220/3.0.  
PREREQUISITE   CISC 124/3.0.

**CISC 223/3.0**                      **Software Specifications**                      **3L**  
Introduction to techniques for specifying the behaviour of software, with applications of these techniques to design, verification and construction of software. Logic-based techniques such as loop invariants and class invariants. Automata and grammar-based techniques, with applications to scanners, parsers, user-interface dialogs and embedded systems. Computability issues in software specifications.  
PREREQUISITE   CISC 124/3.0.  
COREQUISITE   CISC 204/3.0.

**CISC 226/3.0**                      **Game Design**                      **3L**  
An introduction to techniques for designing elementary computer games. Topics will include game development tools and processes, principles of game design, game prototyping and game evaluation.  
PREREQUISITE   CISC 124/3.0.

**CISC 235/3.0**                      **Data Structures**                      **3L;2P**  
Design and implementation of advanced data structures and related algorithms, including correctness and complexity analysis.  
PREREQUISITES   CISC 124/3.0 and CISC 203/3.0.

**CISC 260/3.0**                      **Programming Paradigms**                      **3L**  
Review of imperative programming features. Introduction to other widely used programming paradigms. Functional programming languages, such as LISP and Haskell. Higher order functions, lazy evaluation, abstract and recursive types, structural induction, symbolic expressions. Logic programming languages, such as PROLOG. Operational interpretation of predicates and terms, proof search, unification, backtracking. Typical applications.  
PREREQUISITE   CISC 124/3.0.  
COREQUISITE   CISC 204/3.0.

**CISC 271/3.0**                      **Scientific Computing**                      **3L**  
Introduction to scientific computing: floating point arithmetic, algorithm design, error analysis, ill-conditioning. Zero-finding. Linear equations. Interpolation. Integration. Least-squares fitting. Effective use of library programs, with discussion of their limitations and some aspects of their design and implementation.  
PREREQUISITES   (CISC 101/3.0 or CISC 121/3.0) and MATH 111 and (MATH 120/6.0 or MATH 121/6.0 or MATH 122/6.0 or [MATH 123/3.0 and MATH 124/3.0] or MATH 126/6.0).  
EXCLUSION   No more than 3.0 units from CISC 271/3.0; MATH 272/3.0; PHYS 313/3.0.

**CISC 320/3.0**                      **Fundamentals of Software Development**                      **3L;2P**  
Introduction to management of small and medium-scale software projects. Advanced programming methodology using the programming language C++. Includes a significant programming project.  
PREREQUISITES   CISC 220/3.0 and CISC 235/3.0.

**CISC 322/3.0**                      **Software Architecture**                      **3L;2P**  
Abstractions and patterns of interactions and relationships among modules. Design recovery; relationship of architecture to requirements and testing.  
PREREQUISITES   CISC 203/3.0 and CISC 204/3.0 and CISC 223/3.0 and CISC 235/3.0.

**CISC 324/3.0**                      **Operating Systems**                      **3L**  
Layered operating systems for conventional shared memory computers: concurrent processes. Synchronization and communication. Concurrent algorithms. Scheduling. Deadlock. Memory management. Protection. File systems. Device management. Typical layers.  
PREREQUISITES    CISC 221/3.0 and CISC 235/3.0.

**CISC 325/3.0**                      **Human-Computer Interaction**                      **3L**  
Developing usable software requires that human factors be considered throughout the design and development process. This course introduces a series of techniques for development and evaluating usable software, and shows how these techniques can be integrated into a process for software development.  
PREREQUISITES    CISC 124/3.0 and CISC 235/3.0.  
EXCLUSION    No more than 3.0 units from CISC 325/3.0; SOFT 325/3.0.

**CISC 326/3.0**                      **Game Architecture**                      **3L**  
An introduction to software architectural design through the application domain of game development. Topics will include notations for expressing static and dynamic aspects of software architecture, design patterns, interface design, and application of these techniques to 3D games, mobile games and web-based games.  
RECOMMENDATION    CISC 226/3.0  
PREREQUISITES    CISC 220/3.0 and CISC 235/3.0.  
EXCLUSION    No more than 3.0 units from CISC 322/3.0 and CISC 326/3.0

**CISC 327/3.0**                      **Software Quality Assurance**                      **3L**  
Validation of software throughout the life cycle. Comparative effectiveness in defect removal of formal methods (proofs of correctness), inspection (walkthroughs and reviews), and testing (unit, integration, and system testing; white box versus black box).  
PREREQUISITES    CISC 203/3.0 and CISC 204/3.0 and CISC 220/3.0 and CISC 223/3.0.  
EXCLUSION    No more than 3.0 units from CISC 327/3.0; SOFT 327/3.0.

**CISC 330/3.0**                      **Computer-Integrated Surgery**                      **3L**  
Concepts of computer-integrated surgery systems and underlying techniques such as medical-image computing, robotics, and virtual reality, learned through real-life applications and problems. Techniques learned in class will be applied in a hands-on surgery session where students perform minimally invasive surgery with virtual-reality navigation tools.  
PREREQUISITES    CISC 121/3.0 and (CISC 271/3.0 or MATH 272/3.0).  
EQUIVALENCY    COMP 230/3.0

**CISC 332/3.0**                      **Database Management Systems**                      **3L**  
Data models: relational, entity-relationship. Relational query languages: relational algebra and SQL. Relational database design. Application interfaces and embedded SQL. Storage and indexing.  
PREREQUISITES    CISC 124/3.0 and CISC 204/3.0.  
EXCLUSION    No more than 3.0 units from CISC 332/3.0; COMM 392/3.0.

**CISC 333/3.0**                      **Introduction to Data Mining**                      **3L**  
Supervised and unsupervised learning, neural networks, support-vector machines, decision trees, metric based clustering, distribution-based clustering, rule-based techniques, genetic algorithms. Applications to information retrieval, web mining, customer-relationship management, recommender systems, science and engineering.  
PREREQUISITES    CISC 121/3.0 and CISC 203/3.0 and 3.0 units from STAT and MATH 111/6.0; MATH 110/6.0; MATH 112/3.0.

**CISC 340/3.0**                      **Digital Systems**                      **3L**  
Combinational circuits; sequential circuits; digital systems design; micro-programming; bus structures; data communications; interface design; microprocessor systems.  
PREREQUISITE    CISC 221/3.0.

**CISC 352/3.0**                      **Artificial Intelligence**                      **3L**  
An introduction to the basic principles and tools of artificial intelligence. Problem solving methods and knowledge representation techniques.  
PREREQUISITES    CISC 235/3.0 and CISC 260/3.0.

**CISC 365/3.0**                      **Algorithms I**                      **3L;2P**  
Principles of design, analysis and implementation of efficient algorithms. Case studies from a variety of areas illustrate divide and conquer methods, the greedy approach, branch and bound algorithms and dynamic programming.  
PREREQUISITES    CISC 203/3.0 and CISC 204/3.0 and CISC 235/3.0.

**CISC 422/3.0**                      **Formal Methods in Software Engineering**                      **3L**  
Mathematical methods for describing software behaviour and structure. Topics include (but are not limited to) the following: Requirements specification. Module specification: axiomatic, algebraic, and trace specifications. Abstract models. Verification. Specification-based validation.  
PREREQUISITE    CISC 327/3.0.

**CISC 423/3.0**                      **Software Requirements**                      **3L**  
An integrated approach to discovering and documenting software requirements. Identification of stakeholders; customer, operator, analyst, and developer perspectives. Requirements elicitation. Transition from initial (informal) requirements to semi-formal and formal representations. Requirements analysis process; analysis patterns. Requirements specification techniques. Relation to architecture and user interface design; traceability of requirements.  
PREREQUISITES    (CISC 322/3.0 or CISC 326/3.0) and CISC 325/3.0.  
EXCLUSION    No more than 3.0 units from CISC 423/3.0; SOFT 423/3.0.

**CISC 425/3.0**                      **Advanced User Interface Design**                      **3L**  
Advanced user-interface styles such as eye-tracking input, digital desks, wearable computing, ubiquitous and context-aware computing, and tangible interfaces.  
PREREQUISITE    CISC 325/3.0 or permission of the School.  
EXCLUSION    No more than 3.0 units from CISC 425/3.0; SOFT 425/3.0.

**CISC 426/3.0**                      **Real-Time Systems**                      **3L;1T alt.wks.**  
Design and implementation of real-time embedded applications. Specifying timing properties: formal and semi-formal methods; soft real-time versus hard real-time. Design notations; language constructs. Real-time operating systems. Abstract device interfaces.  
PREREQUISITES    CISC 324/3.0 and CISC 327/3.0.  
EXCLUSION    No more than 3.0 units from CISC 425/3.0; SOFT 425/3.0.

**CISC 432/3.0**                      **Advanced Database Systems**                      **3L**  
Topics include the presentation and storage of data, implementation concerns, and the integration of databases with other areas of computer science.  
PREREQUISITES    CISC 235/3.0 and CISC 332/3.0.

**CISC 434/3.0**                      **Distributed Systems**                      **3L**  
Distributed systems goals, characteristics, and architectures. Processes: models, inter-process communication and coordination. Name services. Consistency and replication. Fault tolerance: design for reliable communication and recovery. Security. Development paradigms based on data types: object, file, and web-based systems.  
PREREQUISITE    CISC 324/3.0.

- CISC 435/3.0**                      **Computer Communications and Networks**                      **3L**  
 Fundamental concepts in the design and implementation of computer communication networks, protocols, and applications. Overview of network architectures; applications; network programming interfaces (e.g., sockets); transport; congestion; routing and data link protocols; addressing; local area networks; wireless networks, mobility management; security.  
 RECOMMENDATION CISC 340/3.0.  
 PREREQUISITE CISC 324/3.0.
- CISC 437/3.0**                      **Performance Analysis**                      **3L**  
 Analytic and empirical evaluation of the performance of software systems. Performance modeling. Experimental design and statistical techniques for empirical performance analysis.  
 PREREQUISITES CISC 324/3.0 and CISC 327/3.0.  
 EXCLUSION No more than 3.0 units from CISC 437/3.0; SOFT 437/3.0.
- CISC 452/3.0**                      **Neural and Genetic Computing**                      **3L**  
 Introduction to neural and genetic computing. Topics include associative memory systems, neural optimization strategies, supervised and unsupervised classification networks, genetic algorithms, genetic and evolutionary programming. Applications are examined, and the relation to biologic systems is discussed.  
 PREREQUISITE CISC 352/3.0, or permission of the instructor.  
 EXCLUSION No more than 3.0 units from COGS 400/3.0; CISC 452/3.0.
- CISC 453/3.0**                      **Topics in Artificial Intelligence**                      **3L**  
 Investigation of selected areas of artificial intelligence research. Possible topics include natural language understanding, computational perception, planning, learning, and neurocomputing.  
 PREREQUISITE CISC 352/3.0.
- CISC 454/3.0**                      **Computer Graphics**                      **3L**  
 Introduction to computer graphics, including a review of current hardware; modelling and transformations in two and three dimensions; visual realism: perspective, hidden surface elimination, and shading; colour models; applications in several fields.  
 PREREQUISITES Level 3 or 4 and CISC 235/3.0 and (MATH 110/6.0 or MATH 111/6.0 or MATH 112/3.0).
- CISC 457/3.0**                      **Image Processing and Computer Vision**                      **3L**  
 Introduction to fundamental concepts and applications in image processing and computer vision. Topics include image acquisition, convolution, Discrete Fourier Transform, image enhancement, edge detection, segmentation, image registration, human contrast perception, colour perception and reproduction, stereo vision.  
 PREREQUISITES (MATH 110/6.0 or MATH 111/6.0 or MATH 112/3.0) and (MATH 120/6.0 or MATH 121/6.0 or MATH 122/6.0 or MATH 123/3.0 or MATH 124/3.0 or MATH 126/6.0) and CISC 124/3.0.
- CISC 458/3.0**                      **Programming Language Processors**                      **3L;2P**  
 Introduction to the systematic construction of a compiler: grammars and languages, scanners, top-down and bottom-up parsing, runtime organization, symbol tables, internal representations; Polish notation, syntax trees, semantic routines, storage allocation, code generation, interpreters.  
 PREREQUISITES CISC 121/3.0 and CISC 221/3.0 and CISC 223/3.0.
- CISC 462/3.0**                      **Computability and Complexity**                      **3L**  
 Turing machines and other models of computability such as  $\mu$ -recursive functions and random-access machines. Undecidability. Recursive and recursively enumerable sets. Church-Turing thesis. Resource-bounded complexity. Complexity comparisons among computational models. Reductions. Complete problems for complexity classes.  
 RECOMMENDATION CISC 365/3.0.  
 PREREQUISITES CISC 223/3.0.

- CISC 465/3.0**                      **Foundations of Programming Languages**                      **3L**  
 Syntax and semantics. Classification of programming languages. The language of *while* programs. The typed lambda calculus. Recursive definitions and domain theory.  
 PREREQUISITES CISC 204/3.0 and CISC 223/3.0 and CISC 260/3.0.
- CISC 466/3.0**                      **Algorithms II**                      **3L**  
 A continuation of CISC 365/3.0. Lower bound theory. Average-case analysis of algorithms. Approximation algorithms. Probabilistic algorithms. Parallel algorithms.  
 PREREQUISITE CISC 365/3.0.
- CISC 471/3.0**                      **Computational Biology**                      **3L;2P**  
 Advanced computational approaches to the problems in molecular biology. Techniques and algorithms for sequence analysis and alignment; molecular databases; protein structure prediction and molecular data mining.  
 PREREQUISITES CISC 271/3.0, CISC 352/3.0, MBIOL 218/3.0 or BIOL 334/3.0 or *BCHM 315/3.0*.
- CISC 472/3.0**                      **Medical Informatics**                      **3L**  
 Current topics in the application of information technology to medicine, including computed tomography and x-ray imaging; 2D and 3D ultrasound; computer-assisted planning of interventional procedures; image registration; computer-assisted surgery; bioelectric signals; picture archiving and communication systems (PACS).  
 RECOMMENDATION PHGY 214/6.0.  
 PREREQUISITES (CISC 271/3.0 or *MATH 272/3.0*) and CISC 330/3.0 (2011-12) and CISC 365/3.0.
- CISC 481/3.0**                      **Syntax Systems for Natural Language**                      **3S**  
 Chomsky grammars, including context-free languages; algorithms for natural language processing. Content will vary from year to year, but may include lexical-functional grammars, ambiguity resolution, parsing algorithms, grammatical inference, Lindenmeyer grammars and grammars for multi-dimensional objects. Students will present seminars.  
 PREREQUISITE Permission of the School.
- CISC 490/3.0**                      **Topics in Computing Science I**                      **3S/L**  
 Content varies. Not offered every year.  
 PREREQUISITE Permission of the instructor.  
 EXCLUSION No more than 3.0 units from *CISC 470/3.0*; CISC 490/3.0 (2005/06 - 2009/10).
- CISC 491/3.0**                      **Topics in Computing Science II**                      **3S/L**  
 Content varies. Not offered every year.  
 PREREQUISITE Permission of the instructor.  
 EXCLUSION No more than 3.0 units from *CISC 470/3.0*; CISC 490/3.0 (2005/06 - 2009/10).
- CISC 497/3.0**                      **Social, Ethical and Legal Issues in Computing**                      **3S**  
 A wide range of topics of current importance in computing, including technical issues, professional questions, and moral and ethical decisions. Students make presentations, deliver papers, and engage in discussion.  
 PREREQUISITE Level 4 and registered in a COMP Major or BMCO or COCA or COGS or CSCI or SODE Specialization Plan and (CISC 365/3.0 or COGS 300/3.0).
- CISC 498/6.0**                      **Information Technology Project**  
 Topic selected under the supervision of a faculty member. Emphasis is on the application of software engineering techniques to the development of a substantial software system. Group work, oral presentation, participation in design and code review meetings, and delivery of complete software specification and design are required.  
 PREREQUISITES Level 4 and registered in a SODE Specialization Plan and (an overall GPA of 1.90 and (a GPA of 2.60 from 30.0 units in CISC) and (CISC 322/3.0 or CISC 326/3.0) and (CISC 325/3.0 or CISC 327/3.0 or SOFT 325/3.0 or SOFT 327/3.0).  
 EXCLUSION No more than 6.0 units from CISC 498/6.0; CISC 499/3.0.

**CISC 499/3.0****Advanced Undergraduate Project**

Topic selected under the supervision of a faculty member. Emphasis may be on the development of a large program, or on more theoretical issues. Independent research, an oral presentation, and a written report are required.

**PREREQUISITE** Level 4 and registered in a COMP Major or BMCO or CSCI Specialization Plan) and (an overall GPA of 1.90) and (a GPA of 2.60 from 30.0 units in CISC) and CISC 365/3.0.

**EXCLUSION** No more than 6.0 units from CISC 498/6.0; CISC 499/3.0.

**COCA 201/3.0      Introduction to Computing and the Creative Arts      1L;2P**

A multidisciplinary studio-oriented overview of computer-based applications in Art, Music, Drama and Film. History of human-computer interaction. Critical and philosophical issues. Animation. Virtual reality. Computer-aided design. Computer games. Enrolment is limited.

**PREREQUISITE** 6.0 units in ARTF or ARTH or DRAM or FILM or MUSC at the 100-level.

**COREQUISITE** CISC 101/3.0 or CISC 110/3.0 or CISC 121/3.0, or permission of the School of Computing.



**COGS 100/3.0**                      **Introduction to Cognitive Science**                      **3L**

An introduction to the historical and contemporary issues, and research findings of the core cognitive science disciplines including artificial intelligence, linguistics, philosophy, and psychology. The emphasis will be on the ways that the interactions among these disciplines leads to an enhanced understanding of the processes of intelligence and intelligent systems.

*NOTE* Also offered as a distance course. Consult Continuing and Distance Studies.

ONE-WAY EXCLUSION May not be taken with or after CISC 352/3.0; PSYC 200/6.0.

**COGS 201/3.0**                      **Cognition and Computation**                      **3L;1T**

An introduction to the role of computation in theories of the mind and thought. Surveys the major models developed to account for various specific aspects of human cognitive processes. Unitary models of cognitive processes are also examined.

PREREQUISITES PSYC 221/3.0 or COGS 100/3.0

EXCLUSION No more than 6.0 units from COGS 200/6.0; COGS 201/3.0; PSYC 220/6.0.

**COGS 300/3.0**                      **Programming Cognitive Models**                      **3L;1T**

Systems and techniques for developing computational models of human cognitive processes. Symbolic artificial-intelligence and neural-network approaches. Students will become familiar with the programming language LISP, and use it in implementing some aspects of cognitive models.

PREREQUISITES (COGS 201/3.0 or COGS 200/6.0 or PSYC 220/6.0) and CISC 352/3.0, or permission of the School.

**COGS 400/3.0**                      **Neural and Genetic Cognitive Models**                      **3L**

Neural and genetic computational techniques, along with models of human cognition, perception, and memory built on these methods. Problem-solving techniques that have arisen from neural and genetic computation are also studied, including optimization, classification, and data reduction.

PREREQUISITE COGS 300/3.0.

EXCLUSION No more than 3.0 units from COGS 400/3.0; CISC 452/3.0.

**COGS 499/3.0**                      **Advanced Undergraduate Project**                      **1.5L**

Topic selected under the supervision of a member of one of the faculties of CISC, LING, PHIL, PSYC. Emphasis may be on experimental, theoretical, or computer implementation topics. Independent research, an oral presentation, and a written report are required.

PREREQUISITE (Level 4 and registered in a COGS Specialization Plan) and (an overall GPA of 1.90) and (a GPA of 2.60 from 30.0 units in CISC) and (a GPA of 2.60 in COGS) and COGS 300/3.0.

**COMP 329/3.0 Introduction to Computer-Integrated Surgery 3L**

An introduction to concepts and novel technologies used in computer-integrated surgery, including image based navigation, medical robotics and virtual reality. Concepts and techniques learned in class will be applied in a hands-on surgery session where students perform minimally invasive surgery with virtual-reality navigation tools.

NOTE MATH P06/3.0 or one Mathematics 4U level course is required.

PREREQUISITE Level 2 or above.

ONE-WAY EXCLUSION: May not be taken with or after CISC 330/3.0 (formerly COMP 230/3.0).

**COMP 390/6.0 Computing Internship I**

A Computing Internship involves spending twelve to sixteen months in a paid internship position in the private or public sectors. Students in a 12-month internship register in COMP 390/6.0 and either COMP 391/3.0 or COMP 392/3.0, or all of COMP 393/3.0, COMP 391/3.0 and COMP 392/3.0. Students in a 16-month internship register in COMP 390/6.0, COMP 391/3.0 and COMP 392/3.0. The Internship Coordinator must be satisfied that the work carried out has educational merit. Successful completion of the course requires submission of a satisfactory report on the experience within thirty days of completion of the work period. The Internship Coordinator is responsible for evaluating the report. The QUIP program includes prior workshops on interviewing, resumé preparation and work performance. Career Services manages the non-academic aspects of the program.

PREREQUISITE GPA of 1.90 and Level 3 and registration in the Bachelor of Computing (Honours) Program and permission of the Chair of Undergraduate Studies.

**COMP 391/3.0 Computing Internship II**

A Computing Internship involves spending twelve to sixteen months in a paid internship position in the private or public sectors. Students in a 12-month internship register in COMP 390/6.0 and either COMP 391/3.0 or COMP 392/3.0, or all of COMP 393/3.0, COMP 391/3.0 and COMP 392/3.0. Students in a 16-month internship register in COMP 390/6.0, COMP 391/3.0 and COMP 392/3.0. The Internship Coordinator must be satisfied that the work carried out has educational merit. Successful completion of the course requires submission of a satisfactory report on the experience within thirty days of completion of the work period. The Internship Coordinator is responsible for evaluating the report. The QUIP program includes prior workshops on interviewing, resumé preparation and work performance. Career Services manages the non-academic aspects of the program.

COREQUISITE COMP 390/6.0 or COMP 393/3.0.

**COMP 392/3.0 Computing Internship III**

A Computing Internship involves spending twelve to sixteen months in a paid internship position in the private or public sectors. Students in a 12-month internship register in COMP 390/6.0 and either COMP 391/3.0 or COMP 392/3.0, or all of COMP 393/3.0, COMP 391/3.0 and COMP 392/3.0. Students in a 16-month internship register in COMP 390/6.0, COMP 391/3.0 and COMP 392/3.0. The Internship Coordinator must be satisfied that the work carried out has educational merit. Successful completion of the course requires submission of a satisfactory report on the experience within thirty days of completion of the work period. The Internship Coordinator is responsible for evaluating the report. The QUIP program includes prior workshops on interviewing, resumé preparation and work performance. Career Services manages the non-academic aspects of the program.

COREQUISITE COMP 390/6.0 or COMP 393/3.0.

**COMP 393/3.0 Computing Internship IV**

A Computing Internship involves spending twelve to sixteen months in a paid internship position in the private or public sectors. Students in a 12-month internship register in COMP 390/6.0 and either COMP 391/3.0 or COMP 392/3.0, or all of COMP 393/3.0, COMP 391/3.0 and COMP 392/3.0. Students in a 16-month internship register in COMP 390/6.0, COMP 391/3.0 and COMP 392/3.0. The Internship Coordinator must be satisfied that the work carried out has educational merit. Successful completion of the course requires submission of a satisfactory report on the experience within thirty days of completion of the work period. The Internship Coordinator is responsible for evaluating the report. The QUIP program includes prior workshops on interviewing, resumé preparation and work performance. Career Services manages the non-academic aspects of the program.

PREREQUISITES GPA of 1.90 and Level 3 and registration in the Bachelor of Computing (Honours) Program and permission of the Chair of Undergraduate Studies.