Master of Science in Computer Science

Department of Computer Science and Software Engineering

Program Coordinator: Dr. Qi Yang  
Office: 213 Ulrich  
Phone: 608.342.1418  
Email: yangq@uwplatt.edu

Statement of Purpose

The purpose of the Joint International Master’s in Computer Science (JIM-CS) is to provide a high-quality, advanced education in computer science in an international setting.

Program Objectives

Graduates will:

1. demonstrate advanced knowledge and skills in computer science;
2. apply fundamental theory and practical methods to construct software systems in an international setting;
3. interact affectively within international and diverse teams;
4. understand how international differences and regional influences affect work done in computer science; and
5. engage in and recognize the importance of life-long learning.

Student Learning Outcomes

Graduates will achieve the following learning outcomes:

1. Foundation: Graduates will have a solid foundation in computer science with advanced knowledge in one or more areas.
2. Practice: Graduates will have demonstrated their ability to apply their knowledge to practical problems on projects involving people from different educational and cultural backgrounds.
3. Culture: Graduates will exhibit cross-cultural communication skills and understand how international and regional differences influence how work is done in the profession.
4. Presentation: Graduates will be capable of effective written and oral communication particularly with respect to preparing, publishing, and presenting technical material to diverse audiences.
5. Growth: Graduates will exhibit skills for adapting to new environments and technologies, adapting to cultural differences, and embracing lifelong learning.

Introduction

The Master of Science in Computer Science provides advanced study in computer science with an international experience. Also called the JIM (Joint International Master’s) program, it is typically taken in three or four semesters: one semester at a “home” institution (the institution which admits the student), one semester at an abroad institution (one of the international partner institutions), and then a final semester at the home institution.

The strength of this program is the international component. Computing today is a global issue, driving industry to seek professionals who are experienced in internationally distributed development and operation of software systems. To gain international experience, students are required to spend at least one semester abroad at one of the partner institutions. This gives all students opportunities to converse and work with students from different cultures. In addition, it increases the variety of courses which can be offered and exposes students to very different perspectives on computer science. Thus graduates of this program achieve dual objectives: deepening their understanding of computer science and learning to communicate in a global environment.

Prerequisites

Those seeking admission to the program must have earned a bachelor’s degree in computer science or closely related field (such as software engineering or informatics) from a regionally or nationally accredited institution. In particular, all students must have had courses in introductory programming and data structures and, in addition, coursework covering at least four of the following topics:

- Computer architecture
- Database design
- Discrete mathematics
- Programming languages
- Operating systems
Master of Science in Computer Science

- Networking
- Software engineering

Applicants from other fields may be required to take undergraduate courses to address deficiencies. Substantial industry experience may be accepted in lieu of coursework in the above areas on a case-by-case basis.

In addition, students must meet the other admission requirements for all master’s programs at UW-Platteville. Enrollment will be limited by the number of positions available at the participating institutions.

Curriculum

The requirements for the curriculum fit into five categories: foundations, electives, project work, culture and language, and writing. The writing requirement consists of either a thesis or a seminar paper; this choice affects the number of credits to be taken in the other categories. The total number of required credits for both options is 30. In addition, students must satisfy requirements for coursework involving significant global content and graduate school requirements for the number of credits at the 7000 level and above.

Other than the courses covering language, all courses are taught in English. There is no requirement that students know another language to enter the program.

Thesis Option

Foundation Courses
Select 12 or more credits from Group A and Group B, with at least 3 credits from Group A and 3 credits from Group B
12

Electives
Select 0-3 credits of the following:
0-3
- ENGRG 5030 Linear Algebra
- ENGRG 6050 Applied Statistics
- PROJMGT 7010 Project Management Techniques I

Project
Select 4-5 credits of the following with at least 1 credit at an abroad institution:
4-5
- COMPUTER 7120 Software Project I
- COMPUTER 7220 Software Project II

Culture/Language/International Studies
Select 2-4 credits with at least 1 credit at an abroad institution.
2-4

Additional Requirements
COMPUTER 7990 Thesis Research
6
At least 9 credits must be earned abroad and 15 credits from courses with significant global content.

Seminar Paper Option

Foundation Courses
Select 15 or more credits from Group A and Group B, with at least 3 credits from Group A and 3 credits from Group B
15

Electives
Select 0-3 credits of the following:
0-3
- ENGRG 5030 Linear Algebra
- ENGRG 6050 Applied Statistics
- PROJMGT 7010 Project Management Techniques I

Project
Select 4-5 credits of the following with at least 1 credit at an abroad institution:
4-5
- COMPUTER 7120 Software Project I
- COMPUTER 7220 Software Project II

Culture/Language/International Studies
Select 2-4 credits with at least 1 credit at an abroad institution.
2-4

Additional Requirements
COMPUTER 7920 Seminar Paper Research
3
At least 9 credits must be earned abroad and 15 credits from courses with significant global content.
Some of these courses are only available in an online format.

All students must take two courses, one at UW-Platteville and one at a partner institution.

All students must take courses relating to the culture and/or language of the abroad institution. This coursework can take many forms. GERMAN 5000 and UW-Platteville Study 5010 (Conversational American English for International Students) count toward this requirement; other courses can be taken upon approval by the department chair or program coordinator. All credits in this category apply towards the significant global content requirement.

**Group A**

Courses with a significant mathematical component or which cover a traditional theoretical concept.

- Formal Methods in Computer Science
- Algorithms and Complexity
- Advanced Database Systems and Data Mining
- Object-Oriented Analysis and Design (offered at UW-Platteville as COMPUTER 5430)
- Natural Language Systems
- Robotics
- Simulation
- Parallel Computing
- Computer Graphics (offered at UW-Platteville as COMPUTER 5920)
- Artificial Intelligence (offered at UW-Platteville as COMPUTER 5030)
- Compiler Construction (offered at UW-Platteville as COMPUTER 7630)
- Computer Security (offered at UW-Platteville as COMPUTER 7460)
- Programming Language Structures (offered at UW-Platteville as COMPUTER 5520)

**Group B**

Applied courses.

- Design Patterns
- Grid and Distributed Computing
- Enterprise Computing
- Software Quality (offered at UW-Platteville as COMPUTER 5730)
- Software Maintenance & Reengineering (offered at UW-Platteville as COMPUTER 5860)
- Neural Networks
- Business Process Engineering
- Fuzzy Logic and Applications
- Real-Time Embedded Systems Programming (offered at UW-Platteville as COMPUTER 6130)
- Software Architecture
- Service-Oriented Architecture
- Human-Computer Interaction
- Mobile Computing
- Advanced Networking Principles
- Web Protocols, Technologies and Applications (offered at UW-Platteville as COMPUTER 5870)

1 These courses have significant global content.

**Foundation Courses**

The foundation courses are divided into two groups with Group A including an element of theory and Group B being more applied. Students are required to take courses from both groups. In addition, certain courses are marked with an asterisk (*) indicating that these have significant global content.

The lists of foundation courses include some which are offered only at partner institutions. Course numbers indicate which are offered at UW-Platteville. The special topics course, COMPUTER 6830, can also count towards the foundations requirement (with a designation in Group A or Group B) upon approval by the department chair or program coordinator.
Writing

All students must take either COMPUTER 7920 or COMPUTER 7990. For the thesis, each student must organize a thesis committee containing at least three qualified individuals. At least one member of the thesis committee must be a member of the department at the student’s home institution and at least one must be a member of a partner institution.

In addition to other graduate school and program requirements, the research paper or thesis must include significant global content. The seminar and thesis credits count towards the total requirement for global content.

COMPUTER 5030 Artificial Intelligence 3 Credits
A study of knowledge representation, search techniques, expert systems, predicate calculus, and natural languages. Discussion of the successes and limitations of past and current AI programs. Programming assignments in LISP and Prolog illustrate formal topics. P: COMPUTER 2630 and MATH 2730.
Components: Class
Typically Offered: Spring

COMPUTER 5430 Object-Oriented Analysis and Design 3 Credits
Requirements engineering, analysis, and specification using the object-oriented paradigm. Object-oriented architectural and detailed design. Use of an OOAD modeling language such as UML. Investigation of OOAD patterns. Moderate size, group project. P: SOFTWARE 2730 and COMPUTER 2430.
Components: Class
Typically Offered: Fall

COMPUTER 5520 Programming Language Structures 3 Credits
A study of programming language topics which include data objects, data types, storage management, syntax, BNF descriptions, semantics, lexical analysis and parsing. Examples taken from traditional languages as well as more modern languages. P: COMPUTER 2630, Object-oriented Programming and Data Structures II.
Components: Class

Typically Offered:

COMPUTER 5730 Software Quality 3 Credits
Study of topics related to producing quality software, including software quality assurance, quality metrics, configuration management, verification and validation, reviews, inspections, audits, and software process improvement models. Individual and team projects. P: COMPUTER 2630 and SOFTWARE 2730.
Components: Laboratory, Class
Typically Offered: Fall

COMPUTER 5860 Software Maintenance and Reengineering 3 Credits
Study of the topics related to maintaining large-scale software systems. Study of software engineering topics such as estimation, software quality assurance, metrics, configuration management, verification and validation, inspections, and personal and team software process as they relate to software maintenance projects. Coverage of traditional analysis and design methods such as structured analysis and design. Two, semester-long, team-based projects: reengineering a small system to be object-oriented and making changes to a moderate-sized existing software project. P: SOFTWARE 3430/COMPUTER 5430 Object-Oriented Analysis and Design, COMPUTER 2630 Object-Oriented Programming and Data Structures II.
Components: Class
Typically Offered: Spring

COMPUTER 5870 Web Protocols, Technologies and Applications 3 Credits
This course will introduce the students to protocols and technologies in Web Applications and Web Services. The Client/Server concept and some advanced database concepts will also be covered. The emphasis of the course will be using tools such as ASP.NET for rapid development of Web Applications and Web Services. P: COMPUTER 3340; C: COMPUTER 3630.
Components: Class
Typically Offered: Fall

COMPUTER 5920 Computer Graphics 3 Credits
An introduction to computer graphics including raster hardware, standard graphics software packages and important algorithms such as window-to-viewport mapping; clipping of lines, characters and polygons; 2D and 3D transformations and hidden line/surface removal. P: COMPUTER 2630 and MATH 3230.
Components: Class
Typically Offered:

COMPUTER 6130 Real-Time Embedded Systems Programming 3 Credits
An exploration of programming techniques and constructs used to develop reliable software systems capable of responding in real time to environmental changes. An overview of the platforms, tools, and processes used in developing software for embedded systems. Hands-on lab projects experimenting with real-time embedded systems programming details. P: COMPUTER 2630 and SOFTWARE 3430 and (ELECTENG 3780 or COMPUTER 3230).
Components: Class
Typically Offered: Spring
COMPUTER 6830 Special Topics in Computer Science 1-3 Credits
The subject matter and instructor for each instance of this class will be listed in the class schedule. Students should check with the instructor for details.
Components: Class
Typically Offered: Fall

COMPUTER 7120 Software Project I 2 Credits
Participation in a semester-long, group software development group project, typically at the students home university. Software engineering techniques and principles will be applied in the development of the project. P: COMPUTER 2630 and SOFTWARE 2730.
Components: Class
Typically Offered: Spring

COMPUTER 7220 Software Project II 2 Credits
Participation in a semester-long, software development group project. This course is only open to JIM-CS students in their "abroad" semester. Application of software engineering techniques and principles to the development of the project. P: COMPUTER 2630 and SOFTWARE 2730.
Components: Class
Typically Offered: Fall

COMPUTER 7460 Computer Security 3 Credits
Introduction to the concepts, theory, and application of Computer Security. Topics include cryptography, digital signatures, authentication and identification schemes, viruses, worms, firewalls, and electronic commerce. P: COMPUTER 3830.
Components: Class
Typically Offered:

COMPUTER 7630 Compiler Construction 3 Credits
Study of the theory and design techniques used in compiler construction, including lexical analysis, parsing, grammars, semantic analysis, code generation, and optimization. P: COMPUTER 3520.
Components: Class
Typically Offered:

COMPUTER 7920 Seminar Paper Research 1-3 Credits
The student will be required to carry out a project and write a technical paper in computer science. The student must demonstrate the ability to survey a field of knowledge and assemble, organize, evaluate, interpret, and present evidence in a logical and intelligent manner. P: Completion of at least 15 credits of computer science graduate courses.
Components: Seminar
Typically Offered:

COMPUTER 7980 Independent Study in Computer Science 1-4 Credits
The amount of graduate credit allowed for independent study may not exceed a total of four credits except with the special permission of the students advisor and the dean of the School of Graduate Studies. Approval must be secured before independent study courses are begun. Students registering for independent study must submit at or before registration a description signed by the instructor conducting the independent study of the subject to be covered. Independent study may not be used for collecting information for the seminar paper.
Components: Independent Study
Typically Offered: Fall/Spring

COMPUTER 7990 Thesis Research 3-6 Credits
The thesis may be an outgrowth of a research course (e.g. TEACHING 7000 Research Procedures) or may be developed independently within the program area. The thesis will report the results of original and independent student research on a given problem or topic, by systematic and impartial methods, and will demonstrate the students ability to use techniques customarily employed in the particular field of investigation. Although a thesis for the masters degree may not always be expected to make a significant contribution to existing knowledge, it should be a scholarly document that is accurate, verifiable, objective, and impartial. In consultation with the program advisor, the student proposes a committee of three faculty members. The committee normally includes the thesis advisor, one additional major department member, and one faculty member from another department. In some instances, a student may prefer a thesis advisor who is different from the program advisor assigned at the time of admission. An approved thesis proposal must be submitted and approved prior to registration. There is a website with useful links to guide the graduate student in grammar, style, evaluating web resources, and formats. (Thesis students will find the Texas A and M link useful for formatting procedures and other technical assistance.) The thesis advisor will provide guidance regarding the site. The site may be accessed through the Universitys Karrmann Library.
Components: Thesis Research
Typically Offered: Fall/Spring