

**DEPARTMENT OF COMPUTER SCIENCE  
UNIVERSITY OF ILLINOIS AT CHICAGO**

**Requirements for BS in Computer Science – Total 128 credit hours**

**Non-engineering and General Education Requirements (48 Credit hours)**

| <u>Course #</u> | <u>Hours</u> | <u>Course Title</u>                             | <u>Pre-Requisites</u>  |
|-----------------|--------------|---|--|
| ENGL 160        | 3            | Academic Writing I                              | Satisfactory performance on dept. placement test                                 |
| ENGL 161        | 3            | Academic Writing II                             | ENGL 160 or the equivalent   |
| MATH 180        | 4            | Calculus I                                      | 'C' or better in MATH 121 or appropriate performance on the dept. placement test |
| MATH 181        | 4            | Calculus II                                     | 'C' or better in MATH 180  |
| MATH 210        | 3            | Calculus III                                    | 'C' or better in MATH 181  |
| EWC             | 3            | Exploring World Cultures course                 | See General Education section for approved list                                  |
| UCA             | 3            | Understanding the Creative Arts course          | See General Education section for approved list                                  |
| UP              | 3            | Understanding the Past course                   | See General Education section for approved list                                  |
| UIS             | 3            | Understanding the Individual and Society course | See General Education section for approved list                                  |
| UUSS            | 3            | Understanding the U.S. Society course           | See General Education section for approved list                                  |
| H/SS/A          | 6            | Humanities / Social Sciences / Art Electives    | Must be selected from list approved by CS department                             |
| SE              | 10           | Science Electives                               | See below for details  |

**Required Courses in CS & COE (39 Credit hours)**

| <u>Course #</u> | <u>Hours</u> | <u>Course Title</u>                            | <u>Pre-Requisites</u>   |
|-----------------|--------------|--|---|
| ENGR 100        | 0            | Engineering Orientation                        | Admission to the College of Engineering   |
| CS 111          | 3            | Program Design I                               | None  |
| CS 141          | 3            | Program Design II                              | CS 109 or CS 111; and credit or concurrent registration in MATH 180             |
| CS 151          | 3            | Mathematical Foundations of Computation        | MATH 180; and 'C' or better in CS 111   |
| CS 211          | 2            | Programming Practicum                          | 'C' or better in CS 141   |
| CS 251          | 4            | Data Structures                                | CS 151 or CS 201; and credit or concurrent registration in CS 211               |
| CS 261          | 3            | Machine Organization                           | Credit/concurrent registration in CS 211  |
| CS 301          | 3            | Languages and Automata                         | 'C' or better in CS 151 or 201; and credit or concurrent registration in CS 251 |
| CS 341          | 3            | Programming Language Design and Implementation | CS 251 and CS 261; or approval of the department                                |
| CS 342          | 3            | Software Design                                | CS 251  |
| CS 361          | 3            | Computer Systems                               | CS 251 and CS 261   |
| CS 362          | 3            | Computer Design                                | CS 261  |
| CS 377          | 3            | Communication and Ethical Issues in Computing  | CS 251  |
| CS 401          | 3            | Computer Algorithms I                          | 'C' or better in CS 251 or MCS 360  |
| CS 499          | 0            | Professional Development Seminar               | Senior & in last semester of study  |

**Technical Electives (18 credit hours from the following, only one course maybe outside the CS rubric)**

| <u>Course #</u> | <u>Hours</u> | <u>Course Title</u>                             | <u>Pre-Requisites</u>   |
|-----------------|--------------|---|---|
| CS 385/461      | 3            | Operating Systems Concepts and Design           | CS 361; or CS 201 & ECE 267   |
| CS 398          | 3            | Undergraduate Design/Research                   | Consent of the instructor   |
| CS 411          | 3            | Artificial Intelligence I                       | CS 251  |
| CS 412          | 3            | Introduction to Machine Learning                | CS 251; & IE 342 / STAT 381; or consent of instructor                       |
| CS 421          | 3            | Natural Language Processing                     | CS 301 or MCS 441   |
| CS 422          | 3            | User Interface Design and Programming           | CS 342  |
| CS 424          | 3            | Visualization and Visual Analytics              | CS 251; or consent of the instructor  |
| CS 425          | 3            | Computer Graphics I                             | CS 251  |
| CS 426          | 3            | Video Game Design and Development               | CS 251; or consent of the instructor  |
| CS 440          | 3            | Software Engineering I                          | CS 342  |
| CS 441          | 3            | Distributed Object Programming Using Middleware | 'C' or better in ((CS 341 or 342) and CS 361)                               |
| CS 442          | 3            | Software Engineering II                         | CS 440  |
| CS 450          | 3            | Introduction to Networking                      | CS 361  |
| CS 455          | 3            | Design and Implementation of Network Protocols  | CS 342 and CS 450   |
| CS 466          | 3            | Advanced Computer Architecture                  | CS 361 or ECE 366   |
| CS 469          | 3            | Computer Systems Design                         | CS 361; or ECE (366 & 368)  |
| CS 473          | 3            | Compiler Design                                 | 'C' or better in ((CS 301 or MCS 441) and (CS 251 or MCS 360) and (CS 261)) |
| CS 474          | 3            | Object-Oriented Languages and Environments      | CS 342  |

|          |   |   |   |
|----------|---|---|---|
| CS 476   | 3 | Programming Language Design   | CS 341 or MCS 360   |
| CS 477   | 3 | Public Policy, Legal, & Ethical Issues in Computing, Privacy and Security | Consent of the instructor   |
| CS 478   | 3 | Software Development for Mobile Platforms                                 | CS 342  |
| CS 480   | 3 | Database Systems  | CS 251  |
| CS 485   | 4 | Networked Operating Systems Programming                                   | CS 385  |
| CS 486   | 3 | Secure Operating System Design and Implementation                         | Credit / concurrent registration in CS 385 and 450; or consent of instructor      |
| CS 487   | 3 | Building Secure Computer Systems  | 'C' or better in CS 385 and senior standing; or consent of the instructor         |
| CS 489   | 3 | Human Augmentics  | Senior standing; or consent of instructor   |
| MCS 320  | 3 | Introduction to Symbolic Computation                                      | 'C' or better in ((MATH 210) and (MCS 260 or CS 107 or CS 109))                   |
| MCS 425  | 3 | Codes and Cryptography  | 'C' or better in ((MATH 215) and (MATH 310 or 320)); or consent of the instructor |
| MCS 471  | 3 | Numerical Analysis  | 'C' or better in (MCS 275 or CS 107 or CS 109); or consent of the instructor      |
| MCS 481  | 3 | Computational Geometry  | 'C' or better in CS/MCS 401 or cons. of instructor                                |
| STAT 471 | 3 | Linear and Non-Linear Programming   | 'C' or better in MATH 310   |

**Required Mathematics Courses (9 credit hours - one must be IE 342 or STAT 381).** Students who take IE 342 cannot get credit for STAT 381 or STAT 401; students may take both STAT 381 and 401. Students may choose to use MCS 471 (Numerical Analysis) as either a CS technical elective or as a required Mathematics course (students may choose where to apply), but not as both.

| <u>Course #</u>            | <u>Hours</u> | <u>Course Title</u>   | <u>Pre-Requisites</u>   |
|----------------------------|--------------|---|---|
| IE 342<br>or<br>STAT 381   | 3            | Probability and Statistics for Engineers<br>Applied Statistical Methods I | MATH 181<br>'C' or better in MATH 210; or approval of department                  |
| MATH 215                   | 3            | Introduction to Advanced Mathematics                                      | 'C' or better in MATH 181 & approval of the dept                                  |
| MATH 220                   | 3            | Introduction to Differential Equations                                    | 'C' or better in MATH 210   |
| MATH 310<br>or<br>MATH 320 | 3            | Applied Linear Algebra<br>Linear Algebra I                                | 'C' or better in MATH 210<br>'C' or better in MATH 215                            |
| MATH 430                   | 3            | Formal Logic I  | 'C' or better in (CS 251 / MCS 261 / MATH 215)                                    |
| MATH 435                   | 3            | Foundations of Number Theory  | 'C' or better in MATH 215   |
| MATH 436                   | 3            | Number Theory for Applications  | 'C' or better in MATH 435   |
| MCS 421                    | 3            | Combinatorics   | 'C' or better in ((MATH 215) and (MATH 310 or 320)); or consent of the instructor |
| MCS 423                    | 3            | Graph Theory  | 'C' or better in ((MATH 215) and (MATH 310 or 320)); or consent of the instructor |
| MCS 471                    | 3            | Numerical Analysis  | 'C' or better in (MCS 275 or CS 107 or CS 109); or consent of the instructor      |
| STAT 401                   | 3            | Introduction to Probability   | 'C' or better in MATH 210; approval of department                                 |
| STAT 473                   | 3            | Game Theory   | STAT 381; or ECON 270; or equivalents   |

**Humanities / Social Science / Arts Electives (Must complete 6 credit hours total. DARS sometimes does not automatically recognize these classes, in those cases submit a petition in the college office SEO 123)**

(i). Any of the courses contained in the EWC, UCA, UP, UIS and /or UUSS general education requirement course lists. (ii) Any course for which either a course in (1) or English 161 is a prerequisite. (iii) All courses in foreign languages; and (iv) All courses in the College of Architecture and Art (with some exceptions).

**Science Electives (10 hours total. Must choose 2 courses from below).** If additional hours are necessary to complete the ten required hours, additional courses may be other courses on this list, courses that have any of these courses as prerequisites, or other sciences and quantitative social sciences courses from a list maintained by the Computer Science department.

| <u>Course #</u>               | <u>Hrs</u> | <u>Course Title</u>   | <u>Course #</u> | <u>Hrs</u> | <u>Course Title</u>                    |
|-------------------------------|------------|---|-----------------|------------|--|
| BIOS 100                      | 5          | Biology of Cells and Organisms                                      | EAES 101        | 4          | Global Environmental Change            |
| BIOS 101                      | 5          | Biology of Populations & Communities                                | EAES 111        | 4          | Earth, Energy and the Environment      |
| CHEM 122 & 123<br>or CHEM 116 | 5          | General College Chemistry I<br>Honors General College Chemistry I   | PHYS 141        | 4          | General Physics I (Mechanics)          |
| CHEM 124 & 125<br>or CHEM 118 | 5          | General College Chemistry II<br>Honors General College Chemistry II | PHYS 142        | 4          | General Physics II (Electr. & Magnet.) |

**Free Electives (14 credit hours)**