

COMX 485 Communication and Health 3

COMX 491 Special Topics 1 To 3

COMX 492 Independent Study 1 To 9

Commentary: A maximum of 6 credits in COMX 312 may count toward a minor in communication studies.

Commentary: Degree Commentary

Once admitted to earn a minor, the student must complete a minimum of 20 credits in COMX courses, with at least 9 credits in courses numbered 300 and above.

Department Faculty

Professor

- Betsy Wackernagel Bach, Professor
- Sara Hayden, Professor
- Gregory Larson, Professor
- Steve Schwarze, Professor & Department Chair
- Alan Sillars, Professor
- Stephen Yoshimura, Professor

Associate Professors

- Joel Iverson, Associate Professor
- Christina Yoshimura, Associate Professor of Communication Studies (M.A., Ph.D.) and Mental Health Counselor (M.A.)

Adjunct Instructor

- Lucy Beighle, Adjunct instructor
- Phyllis Ngai, Adjunct Associate Professor

Lecturer

- David Airne, Director of Debate

Course Descriptions

Communication

COMX 111A - Intro to Public Speaking

Credits: 3. Offered every term. Preparation, presentation, and criticism of speeches. Emphasis on the development of public speaking techniques through constructive criticism. Credit not allowed for both COMM 111A and COM 160A. Course Attributes: Expressive Arts Course

COMX 115S - Introduction to Interpersonal Communications

Credits: 3. Offered autumn and spring. An overview of the process of human communication with special emphasis on analyzing communication patterns and improving interpersonal communication skills. Credit not allowed for both COMM 110S and COM 150S. Course Attributes: Social Sciences Course

COMX 191S - Special Topics

Credits: 1 TO 9. (R-9) Offered intermittently. Experimental offerings of visiting professors, experimental offerings of new courses, or one-time offerings of current topics. Course Attributes: Internships/Practicums Social Sciences Course

COMX 202S - Nonverbal Communication

Credits: 3. Offered yearly. Nonverbal code systems and how they function in human communication including gestures, facial expressions, personal space, and others. Course Attributes: Social Sciences Course

COMX 204X - International & Dvlpmnt Comm

Credits: 3. Offered yearly. International Communication is concerned with information exchange across national borders while Development Communication focuses on the historical, current, and prospective role of communication technologies in social change, improving living conditions, and enhancing life prospects-mainly in developing countries. Course Attributes: Indigenous and Global

COMX 210 - Communication in Small Groups

Credits: 3. Offered autumn and spring. Theory and research related to communication roles, collaboration, cohesion, leadership, and decision-making. Experiences provided in task oriented groups and field analyses of group processes.

COMX 220S - Intro to Organizational Comm

Credits: 3. Offered yearly. Theory and research on communication in organizations. Focus on topics such as productivity, power, culture, socialization, technology and globalization covering a wide range of organizations including corporations, government, educational institutions, non-profit agencies and media organizations. Course Attributes: Social Sciences Course

COMX 222 - Professional Communication

Credits: 3. Offered intermittently. Explores communication skills needed in business and professional contexts. Focus on developing a working knowledge of theory and skills for interpersonal communication, group communication, and business writing. Concepts include communication processes, diversity in the workplace, nonverbal communication, technical communication, communication with customers, and employment communication.

COMX 240H - Intro to Rhetorical Theory

Credits: 3. Offered yearly. An overview of rhetorical theory including an exploration of classical rhetoric, British and Continental rhetorical theory, and contemporary theories of language and persuasion. Course Attributes: Historical & Cultural Course

COMX 241 - Persuasive Communication

Credits: 3. Offered yearly. The use of communication in attitude and behavior change as experienced in personal, organizational, and public contexts.

COMX 242 - Argumentation

Credits: 3. Offered autumn and spring on the Mountain campus, offered intermittently on the Missoula College campus. Development of argumentation skills and critical judgment in decision-making and debate. Includes criticism, construction, presentation, and refutation of spoken and written arguments.

COMX 311 - Family Communication

Credits: 3. Offered yearly. Not open to PCOM. Prereq., COMX 115 or consent of instructor. An examination of communication in husband-wife, parent-child, and extended family relationships. Topics include intimacy, power, decision-making, problem solving, identity formation, and interpersonal perception.

COMX 312 - Forensics/Honors

Credits: 1 TO 3. (R-12) Offered every term. Preparation and participation in competitive speech and debate, including Lincoln/Douglas and Parliamentary debate. The team travels to regional competitions and hosts on-campus and intramural debates and speaking events. Up to 6 credits may apply toward a major or minor in communication studies.

COMX 343 - Persuasive Speaking and Critic

Credits: 3. Offered yearly. Prereq., COMM 111A or consent of instructor. Not open to PCOM. The persuasive process through the criticism and creation of speeches and other rhetorical artifacts emphasizing the role persuasion plays in creating and shaping our culture.

COMX 347 - Rhetoric Nature & Environmentlsm

Credits: 3. Offered every other year. Same as ENST 377. Not open to PCOM. Survey of rhetorical texts that shape public understanding of nature and environmental issues. Analysis of a range of historical and contemporary environmental texts using theoretical concepts from the rhetorical tradition. Course Attributes: Writing Course-Advanced

COMX 349 - Comm Consump & Climate

Credits: 3. Offered every other year. Same as CCS 349. Not open to PCOM majors. Analyzes consumption as a communication practice, investigates discourses that promote consumption, and illuminates environmental impacts on consumption.

COMX 351 - Principles of Public Relations

Credits: 3. Offered yearly. Not open to PCOM. The many uses of communication in the endeavor of public relations. Communication theories and models including interpersonal communication, organizational communication, and mass communication are applied to explore the internal and external communication behavior associated with public relations.

COMX 352 - Public Relations Portfolio

Credits: 3. Offered yearly. Not open to PCOM. Writing documents such as press releases, fact sheets, brochures and speeches to create relationships between organizations and their publics.

COMX 380 - Gender and Communication

Credits: 3. Offered yearly. Not open to PCOM. The meaning of gender in our culture. Examines how gender is displayed and perpetuated through social institutions such as the media and through our private and public verbal and nonverbal interactions.

COMX 391 - Special Topics

Credits: 1 TO 9. (R-9) Offered intermittently. Not open to PCOM. Experimental offerings of visiting professors, experimental offerings of new courses, or one-time offerings of current topics.

COMX 398 - Internship

Credits: 1 TO 6. (R-6) Offered autumn and spring. Not open to PCOM. Prerequisite, consent of instructor. Extended classroom experience that provides practical application of classroom learning during placements off campus. Prior approval must be obtained from the faculty supervisor and the Internship Services office. A maximum of 6 credits of Internship (398, 498) may count toward graduation. Offered C/NCR only. Course Attributes: Internships/Practicums Internship graduation limit 6

COMX 412 - Communication and Conflict

Credits: 3. Offered autumn and spring. Not open to PCOM. Conceptual and practical discussions of communication and conflict in interpersonal relationships, organizational settings and overall cultural milieu. Topics include culture, power, styles, negotiation and bargaining, mediation, dissent, dispute systems, and crisis communication. Credit is not allowed for both COMM 413 and COMM 412.

COMX 413 - Comm & Conflict-Writing

Credits: 3. Offered yearly. Not open to PCOM. Conceptual and practical discussions of communication and conflict in interpersonal relationships, organizational settings and overall cultural milieu. Fulfills Upper-Division Writing requirement for Communication Studies majors. Credit is not allowed for both COMX 413 and COMX 412. Course Attributes: Writing Course-Advanced

COMX 414 - Comm in Personal Relationships

Credits: 3. Offered yearly. Prerequisite, COMX 115S or consent of instructor. Not open to PCOM. An examination of the functions, types, and historical context of close personal relationships with an in-depth study of the role of communication in friendships and romantic relationships. Course Attributes: Writing Course-Advanced

COMX 415 - Intercultural Communication

Credits: 3. Offered autumn and spring. Not open to PCOM. Communication principles and processes in cross-cultural environments. Non-Western cultures are emphasized by contrasting them to Western communication norms.

COMX 421 - Comm in Non-Profit Organizatns

Credits: 3. Offered yearly. Not open to PCOM. Focuses on issues in nonprofit organizational communication at macro and micro levels. Topics include: organizational identity, change processes, public relations, fund-raising,

advocacy, socialization, stress and burnout, board management and professionalization. Course Attributes: Writing Course-Advanced

COMX 422 - Communication and Technology

Credits: 3. Offered every other year. Not open to PCOM. This course takes a critical look at the influence of communication technologies on organizational communication. Students will examine how the world of work is changing due to new technologies and explore the social and ethical implications of technical innovation, adoption and use. Course Attributes: Writing Course-Advanced

COMX 423 - Org Comm Consult & Train

Credits: 3. Offered every year. Prerequisite, COMX 220S or consent of instructor. Not open to PCOM. Emphasis on the theoretical and practical issues involved in communication training and consultation. Overview of theoretical models followed by the "nuts and bolts" of communication training, development, and assessment. Students will carry out a training or consultation project (e.g., planning, execution, and evaluation) to sharpen the issues explored.

COMX 424 - Risk Crisis & Comm

Credits: 3. Offered every other year. Not open to PCOM. This course explores the communicative dynamics that both prevent and cause organizational crisis. Through case studies, the class examines how people plan, communicate and make good decisions in high-risk situations, as well as how to manage crisis public relations effectively. Course Attributes: Writing Course-Advanced

COMX 425 - Comm in Health Organizations

Credits: 3. Offered every other year. Not open to PCOM. This course explores the key issues at the intersection of health communication and organizational communication by considering communication processes that occur in a number of distinct contexts of health organizations. Through case studies and health campaigns students explore contemporary concerns and theory in the area of health communication.

COMX 445 - Rhetorical Criticism and Theor

Credits: 3. Offered yearly. Not open to PCOM. Introduction to study of rhetorical criticism and theory. Current theoretical and methodological issues and approaches including traditional criticism, experiential criticism, dramatism, narrative criticism, feminist criticism, postmodern criticism. Course Attributes: Writing Course-Advanced

COMX 447 - Rhetorical Constrctn of Woman

Credits: 3. Offered every other year. Not open to PCOM. Explores the rhetoric surrounding contemporary women's social "activism" in the U.S. Topics include women's rights, women's liberation, consciousness raising as a rhetorical form, reproductive rights, sexuality, and intersections between gender, race, and class. Course Attributes: Writing Course-Advanced

COMX 449 - Rhetoric of Women's Activism

Credits: 3. Offered every other year. Not open to PCOM. Explores the rhetoric surrounding contemporary women's social "activism" in the U.S. Topics include women's rights, women's liberation, consciousness raising as a rhetorical form, reproductive rights, sexuality, and intersections between gender, race, and class. Course Attributes: Writing Course-Advanced

COMX 460 - Research Methods

Credits: 3. Offered autumn and spring. Open only to majors in COMM. Prereq. grade of C- or better in EDU 421 or EDLD 486 or PSYX 222 or SOCI 202 or STAT 216. Introduction to the major types of communication research and the foundations of quantitative research methods.

COMX 461 - Communication Research Seminar

Credits: 1 TO 3. (R-9) Offered autumn and spring. coreq., COMX 460. Application of quantitative and qualitative research methods to specialized contexts. Emphasis on direct student involvement in research activities.

COMX 485 - Communication and Health

Credits: 3. Offered yearly. Not open to PCOM. Theory and research on the health correlates of human interaction.

COMX 491 - Special Topics

Credits: 1 TO 3. (R-9) Offered intermittently. Not open to PCOM. Experimental offerings of visiting professors, experimental offerings of new courses, or one-time offerings of current topics.

COMX 492 - Independent Study

Credits: 1 TO 9. (R-9) Offered every term. Prerequisite, consent of instructor. Offered C/NCR only.

COMX 510 - Sem Personal Relationships

Credits: 3. (R-6) Offered yearly. Examines theory and research on the process and functions of communication in personal relationship contexts. Interdisciplinary readings illuminates the dynamics of communication in the development, maintenance, and deterioration of romantic relationships, friendships, and family relationships. Discussion and assignments center around theoretical, methodological, and practical issues in research on communicative activities and events in personal relationships. Level: Graduate

COMX 511 - Survey Interpersonal Comm

Credits: 3. Offered every other year. Survey of theories and research in interpersonal communication including definitions of interpersonal communication, its place in the field of communication, and methodological issues. Overall emphasis on foundational readings and recent research developments. Level: Graduate

COMX 512 - Sem Comm Conflict

Credits: 3. (R-6) Offered intermittently. A review and discussion of current research regarding conflict in different levels and contexts of communication. Level: Graduate

COMX 514 - Alt Dispute Resolution

Credits: 3. Offered yearly. Same as LAW 614. A study of the varieties of dispute resolution vehicles outside the court process. Focus on a 40-hour component of practical skills training for the mediation practitioner. Topics include the mediation model, interest-based negotiation and effective communication. Level: Graduate

COMX 515 - Enviro Negotiation Mediation

Credits: 3. Same as NRSM 515 and ENST 515. This course prepares students to effectively engage in multiparty negotiation on natural resource and environmental issues. It is grounded in theory and provides an opportunity to develop practical skills in both negotiation and facilitation/mediation. Guest speakers, case studies, and simulations allow students to develop, test, and refine best practices. The course is face-paced, highly interactive, and serves as the second of three required courses in the Natural Resources Conflict Resolution Program. Level: Graduate

COMX 520 - Sem in Organiz Communication

Credits: 3. (R-6) Offered every other year. Introduction to theories and research in organizational communication. Topics include culture, networks, structure, technology, identity, power, resistance, gender, and globalization. Overall emphasis on foundational readings and recent research developments. Level: Graduate

COMX 540 - Sem Instructional Comm

Credits: 3. Offered every other year. Instruction in the theories, concepts, principles, and skills employed university level classroom communication and instruction. Level: Graduate

COMX 541 - Tchg the Basic Course

Credits: 2. (R-8) Offered autumn and spring. Prereq., consent of instr. Restricted to Communication majors only. Offered C/NCR only. Level: Graduate

COMX 555 - Sem Rhet Crit & Theory

Credits: 3. Offered annually. Introduction to contemporary issues in rhetorical criticism and theory. Methods reviewed include classical criticism, dramatism, close textual analysis, ideographic criticism, narrative criticism, feminist criticism, and postmodern criticism. Level: Graduate

COMX 561 - Qual Research Methods

Credits: 3. Offered every year. An emphasis on the philosophy and practice of qualitative inquiry, the development and use of descriptive frameworks, and gathering and testing qualitative data to develop human communication theory. Level: Graduate

COMX 572 - Family Law Mediation

Credits: 3. Offered autumn. Same as LAW 672. Interdisciplinary course on advanced mediation skills with a focus on family mediation including divorce and other types of family problems. Psychological issues for both children and parents, power balancing, gender issues and interest-based negotiation model. Level: Graduate

COMX 575 - Sem:Rhet&Env'l Controversy

Credits: 3. Offered every other year. Same as ENST 575. The study of how advocates use symbols to influence meaning and action in environmental controversies. Rhetorical theory is used to identify, analyze, and evaluate persuasive strategies and tactics. Level: Graduate

COMX 585 - Comm Across Sciences

Credits: 3. Offered yearly. Focus on communication practices that facilitate interdisciplinary interactions across the sciences and result in more competent communication. Offered only to graduate student trainees enrolled in the M-EID program. Level: Graduate

COMX 593 - Professional Paper

Credits: 1 TO 3. (R-6) Offered every term. Prereq., consent of instr. Preparation of a professional paper appropriate to the needs and objectives of the individual student. Level: Graduate Course Attributes: Faculty-Led Study Abroad

COMX 594 - Topical Seminar

Credits: 1 TO 2. (R-6) Offered intermittently. Prereq., consent of instr. A review and discussion of current research.

Topics vary. Level: Graduate

COMX 595 - Special Topics

Credits: 1 TO 9. (R-9) Offered intermittently. Experimental offerings of visiting professors, experimental offerings of new courses, or one-time offerings of current topics. Level: Graduate Course Attributes: Internships/Practicums

COMX 596 - Independent Study

Credits: 1 TO 9. (R-9) Offered every term. Prereq., consent of instr. Course material appropriate to the needs and objectives of the individual student. Level: Graduate Course Attributes: Service Learning/Volunteer

COMX 599 - Thesis

Credits: 1 TO 9. (R-9) Offered every term. Prereq., consent of instr. Preparation of a thesis or manuscript based on research for presentation and/or publication. Level: Graduate

Computer Science Department

Yolanda Reimer, Chair

The growing utility of computers in research and education, as well as the increased impact of computers on our modern society, strongly implies that knowledge of computers and their capabilities should be a part of the basic education of all students. The courses listed below are designed to provide the student with this knowledge and to prepare the student for a career in a field in which there is a growing need for trained personnel. The objective of the undergraduate curriculum in computer science is to develop professionally competent, broadly educated computer scientists who wish to pursue professional careers or graduate studies.

The B.S. program is accredited by the Computing Accreditation Commission of ABET (<http://www.abet.org>). For more information, access our homepage <http://www.cs.umt.edu> or email the chair at yolanda.reimer@umontana.edu.

High School Preparation: In addition to general University admission requirements, pre-college preparation should include as many computer science courses as possible, and four years of high school mathematics, to include algebra, trigonometry and pre-calculus. Also recommended are physics, chemistry and biology.

Admission Requirements

Admission to computer science courses varies according to course level and other departmental standards. However, students must have completed all prerequisite courses with a grade of at least a "C-".

Lower-Division Courses

Most 100- and 200-level courses are open on a first-come, first-served basis to all students who have the prerequisites.

Upper-Division Courses

Admission to 300-level or above courses requires successful completion of the prerequisites.

Major-Minor Status

Completed change of major forms along with college transcripts must be turned in to the department when declaring computer science as a major or minor.

College Humanities & Sciences Catalog Year: 2015-2016

Degree Type: Bachelor of Science Level: Major Subject: **Mathematical Sci-Computer Sci**

Total Credits: 73 Cumulative GPA Required: 2.0

The purpose of the combined program is to provide a thorough background in both allied disciplines and to inculcate a deeper understanding of their goals and methods. A student must complete 60 credits in the two disciplines: 30 of these credits in Computer Science courses and 30 of these credits in Mathematical Sciences courses. Each student plans a program in consultation with a Computer Science and a Mathematical Sciences advisor. Students planning to attend graduate school in computer science or the mathematical sciences should consult with their respective advisors.

Category Name: Mathematical Sciences Rule: Complete the following subcategories.

Criterion: Number of Credits 31

Course Listing Commentary:

Subcategory Name: Mathematical Sciences Core Rule: Complete all of the following courses.

Criterion: C- Number of Credits 19

Course Listing

M 171	Calculus I	4	F,S
M 172	Calculus II	4	F,S
M 221	Introduction to Linear Algebra	4	F,S
M 273	Multivariable Calculus	4	F,S
M 307	Intro to Abstract Mathematics	3	F,S

Commentary: The following substitutions are allowed: M 181 for M 171, M 182 for M 172, and M 225 for M 307.

Subcategory Name: Mathematical Sciences Electives Rule: Complete 12 credits from the following courses.

Criterion: C- Number of Credits 12

Course Listing

M 311	Ordinary Diff Equations/System	3	F
M 325	Discrete Mathematics	3	
M 326	Number Theory	3	S
M 361	Discrete Optimization	3	S
M 362	Linear Optimization	3	F
M 381	Advanced Calculus I	3	F
M 412	Partial Differential Equations	3	S
M 414	Deterministic Models	3	
M 429	History of Mathematics	3	S

M 431	Abstract Algebra I	4	F	
M 432	Abstract Algebra II	4	S	
M 439	Euclidean & Non-Euclidean Geo	3	F	
M 440	Numerical Analysis	4	I	
M 445	Stat/Math/Comp Modeling	4	FO	
M 461	Practical Big Data Analytics	3		
M 462	Theoretical Big Data Analytics	3		
M 472	Intro to Complex Analysis	4	S	
M 485	Graph Theory	3	F	
STAT 341	Intro to Probability and Stat	3	F,S	
STAT 421	Probability Theory	3	F	
STAT 422	Mathematical Statistics	3	S	
STAT 451	Statistical Methods I	3	F	
STAT 452	Statistical Methods II	3	S	

Commentary: The combined nine credits of Computer Science Electives and twelve credits of Mathematical Sciences Electives must include at least three 3- or 4-credit courses numbered 400 or above, with at least one chosen from each department (not including M 429 and STAT 451, 452).

Commentary: null Lower Division Core

Category Name: Computer Science

Rule: Complete the following subcategories.

Criterion: Number of Credits 30

Course Listing Commentary:

Subcategory Name: Computer Science Core Rule: Complete all of the following courses.

Criterion: C- Number of Credits 21

Course Listing

CSCI 106	Careers in Computer Science	1	F	
CSCI 135	Fund of Computer Science I	3	F,S	
CSCI 136	Fund of Computer Science II	3	F,S	
CSCI 205	Programming Languages w/ C/C++	4		
CSCI 232	Data Structures and Algorithms	4	F	
CSCI 332	Design/Analysis of Algorithms	3	S	
CSCI 361	Computer Architecture	3	S	

Subcategory Name: Computer Science Electives Rule: Complete 9 credits from the following courses.

Criterion: C- Number of Credits 9

Course Listing

CSCI 315E	Computers, Ethics, and Society	3	F	
CSCI 323	Software Science	3	F	
CSCI 340	Database Design	3	S	
CSCI 390	Research	1 To 6		
CSCI 392	Independent Study	1 To 6	F,S	
CSCI 394	Seminar	1 To 6		
CSCI 398	Internship	1 To 3	F,S	
CSCI 411	Advanced Web Programming	3		

CSCI 412	Game and Mobile App	3		
CSCI 426	Adv Prgrmg Theory/Practice I3		F	
CSCI 427	Adv Prgrmg Theory/Practice II	3		S
CSCI 438	Theory of Computation3			
CSCI 441	Computer Graphics Programming	3		I
CSCI 443	User Interface Design	3		S
CSCI 444	Data Visualization	3		F
CSCI 446	Artificial Intelligence	3		I
CSCI 447	Machine Learning	3		S
CSCI 448	Pattern Recognition	3		I
CSCI 451	Computational Biology	3		F
CSCI 460	Operating Systems	3		F
CSCI 464	Applications Mining Big Data	3		
CSCI 466	Networks	3		S
CSCI 473	Cryptography	3		
CSCI 477	Simulation	3		S
CSCI 478	Multimedia Data Processing	3		
CSCI 480	Parallel Computing	3		
CSCI 490	Research	1 To 6		
CSCI 491	Special Topics	1 To 6		
CSCI 492	Independent Study	1 To 6		
CSCI 494	Seminar	1 To 6		
CSCI 498	Internship	1 To 3		F
CSCI 499	Senior Thesis/Capstone	1 To 6		S

Commentary: (1) A total of at most three of the nine credits of Computer Science Electives may be in CSCI 398 or 498.

(2) The combined nine credits of Computer Science Electives and twelve credits of Mathematical Sciences Electives must include at least three 3– or 4–credit courses numbered 400 or above, with at least one chosen from each department (not including M 429 and STAT 451, 452).

Commentary: Lower Division Core

Category Name: Science Requirement

Criterion: Number of Credits 9-10

Course Listing Commentary:

Subcategory Name: Biology

Rule: If you choose biology, complete all of the following courses.

Criterion: C- Number of Credits 9

Course Listing

BIOB 160N	Principles of Living Systems	4		F,SU
BIOB 170N	Princpls Biological Diversity	3		S,SU
BIOB 171N	Princpls Biological Dvrsty Lab	2		S,SU

Subcategory Name: Chemistry

Rule: If you choose chemistry, complete all of the following courses.

Criterion: C- Number of Credits 10

Course Listing

CHMY 141N College Chemistry I 5 F,S
CHMY 143N College Chemistry II 5 S,SU

Subcategory Name: Physics

Rule: If you choose physics, complete all of the following courses.

Criterion: C-

Course Listing Number of Credits 10

PHSX 215N Fund of Physics w/Calc I 4 F
PHSX 216N Physics Laboratory I w/Calc 1 F
PHSX 217N Fund of Physics w/Calc II 4 S
PHSX 218N Physics Laboratory II w/Calc 1 S

Commentary: Lower Division Core

Category Name: Public Speaking Requirement Rule: Complete 1 of the following courses.

Criterion: C- Number of Credits 3

Course Listing

COMX 111A Intro to Public Speaking 3 F,S
COMX 242 Argumentation 3 F,S

Upper Division Writing

Category Name: Advanced College Writing Requirement Rule: Complete 1 of the following courses.

Criterion: C- Number of Credits 3

Course Listing

CSCI 315E Computers, Ethics, and Society 3
CSCI 499 Senior Thesis/Capstone 1 To 6

M 429 History of Mathematics 3

M 499 Senior Thesis 1 To 12

Commentary: Any other approved Advanced College Writing course will also fulfill this requirement.

Commentary: Additional Requirements

Category Name: Suggested Curricula

Commentary: Students are encouraged to choose their Computer Science and Mathematical Sciences Electives according to one of the following curricula; these tracks are suggestions only and, as such, optional.

Applied Math–Scientific Programming: M 311, 412, 414, and one course chosen from M 381, 440, 472, 473 and STAT 341. Three courses chosen from CSCI 441, 444, 460, 477.

Combinatorics and Optimization–Artificial Intelligence: M 361, 362, and two courses chosen from M 325, 414, 485 and STAT 341; and CSCI 446, 447, and 460.

Statistics–Machine Learning: STAT 341, 421, and two courses chosen from M 325, 362, 485 and STAT 422. Three courses chosen from CSCI 340, 444, 446, 447, and 451.

Algebra–Analysis: M 381, 431, and two courses chosen from M 326, 432, 472, 473; CSCI 426, 460, and one other course.

College Humanities & Sciences

Catalog Year: 2015-2016

Degree Type: Bachelor of Science Level: Major Subject: **Computer Science: Interdisciplinary**

Total Credits: 87 Cumulative GPA Required: 2.0

Lower Division Core

Category Name: Computer Science Core Courses Rule: Must complete all of the following:courses

Criterion: C- Number of Credits 33

Course Listing

CSCI 106	Careers in Computer Science	1	F
CSCI 135	Fund of Computer Science I	3	F,S
CSCI 136	Fund of Computer Science II	3	F,S
CSCI 205	Programming Languages w/ C/C++	4	S
CSCI 232	Data Structures and Algorithms	4	F
CSCI 315E	Computers, Ethics, and Society	3	F
CSCI 323	Software Science	3	F
CSCI 426	Adv Prgrmng Theory/Practice I	3	F
CSCI 427	Adv Prgrmng Theory/Practice II	3	S

Commentary: 100-level CSCI courses other than CSCI 106, CSCI 135-136, and 200-level CSCI courses other than CSCI 205 and CSCI 232 do not count toward the degree or track requirements. However, they do count in the 60 credit limit in the major.

CSCI 315E will fulfill the upper division writing requirement.

Commentary: . Major Electives

Category Name: Degree Electives

Rule: Must complete 6 credits from the following courses

Criterion: C- Number of Credits 6

Course Listing

CSCI 340	Database Design	3
CSCI 390	Research	1 To 6
CSCI 391	Special Topics	1 To 6
CSCI 392	Independent Study	1 To 6
CSCI 394	Seminar	1 To 6
CSCI 398	Internship	1 To 3
CSCI 411	Advanced Web Programming	3
CSCI 412	Game and Mobile App	3
CSCI 438	Theory of Computation	3
CSCI 441	Computer Graphics Programming	3
CSCI 443	User Interface Design	3
CSCI 444	Data Visualization	3
CSCI 446	Artificial Intelligence	3
CSCI 447	Machine Learning	3
CSCI 448	Pattern Recognition	3
CSCI 451	Computational Biology	3
CSCI 460	Operating Systems	3
CSCI 466	Networks	3
CSCI 473	Cryptography	3
CSCI 477	Simulation	3
CSCI 478	Multimedia Data Processing	3
CSCI 490	Research	1 To 6

CSCI 491	Special Topics	1 To 6
CSCI 498	Internship	1 To 3
CSCI 499	Senior Thesis/Capstone	1 To 6

Commentary: A total of at most 3 of the 6 credits of CS electives may be in CSCI 398 or 498.

Upper Division Electives

Category Name: Interdisciplinary Electives

Rule: Must complete 12 credits numbered 200 or above in a field other than Computer Science
 Criterion: C-
 Number of Credits 12

Course Listing

Commentary: Student must complete all the requirements for a minor or additional major in any field other than Computer Science.

Commentary: Other Courses

Category Name: Communication

Rule: Must complete 1 of the following courses

Criterion: C- Number of Credits 3

Course Listing

COMX 111A	Intro to Public Speaking	3
COMX 242	Argumentation	3

Degree Specific Mathematics Category Name: Mathematics Rule: Take the following:

Criterion: C- Number of Credits 18

Course Listing

M 171	Calculus I	4	F,S
M 172	Calculus II	4	F,S
M 221	Introduction to Linear Algebra	4	F,S
M 225	Intro to Discrete Mathematics	3	F
STAT 341	Intro to Probability and Stat	3	F,S

Degree Specific Natural Sciences Category Name: Science Core

Rule: Must complete 1 of the following subcategories of science sequences
 Criterion: Number of Credits 9-10

Course Listing Commentary:

Subcategory Name: Biology

Rule: May complete the following sequence

Criterion: C- Number of Credits 9

Course Listing

BIOB 160N	Principles of Living Systems	4
BIOB 170N	Princpls Biological Diversity	3
BIOB 171N	Princpls Biological Dvrsty Lab	2

Subcategory Name: Chemistry

Rule: May complete the following sequence

Criterion: C- Number of Credits 10

Course Listing

CHMY 141N	College Chemistry I	5
CHMY 143N	College Chemistry II	5

Subcategory Name: Physics

Rule: May complete the following sequence

Criterion: C- Number of Credits 10

Course Listing

PHSX 215N Fund of Physics w/Calc I 4

PHSX 216N Physics Laboratory I w/Calc 1

PHSX 217N Fund of Physics w/Calc II 4

PHSX 218N Physics Laboratory II w/Calc 1

Degree Specific Natural Sciences Category Name: Science Electives

Rule: Must complete 2 of the following courses

Criterion: C- Number of Credits 6-10

Course Listing

ASTR 134N Elementary Astronomy Lab I 1 F

ASTR 135N Elementary Astronomy Lab II 1 S

BIOB 160N Principles of Living Systems 4 F,SU

BIOB 170N Princpls Biological Diversity 3 S,SU

BIOB 171N Princpls Biological Dvrsty Lab 2 S,SU

BIOM 250N Microbiology for Hlth Sciences 3 S

BIOM 251 Microbiology Hlth Sciences Lab 1 S

CHMY 141N College Chemistry I 5 F,S

CHMY 143N College Chemistry II 5 S,SU

FORS 201 Forest Biometrics 3 F

GEO 101N Intro to Physical Geology 3 F

GEO 102N Intro to Physical Geology Lab 1 F

GEO 225 Earth Materials 4 S

PHSX 215N Fund of Physics w/Calc I 4 F

PHSX 216N Physics Laboratory I w/Calc 1 F

PHSX 217N Fund of Physics w/Calc II 4 S

PHSX 218N Physics Laboratory II w/Calc 1 S

PHSX 343 Modern Physics 3 F

Commentary: The Biology, Chemistry, or Physics sequence chosen to fulfill the science core may not count toward the science electives requirement. Laboratory courses must be taken in conjunction with their associated lecture course. A total of 17-18 credits of science is required from the science core plus the science electives.

College Humanities & Sciences Catalog Year: 2015-2016

Degree Type: Bachelor of Science Level: Major Subject: **Computer Science: Professional**

Total Credits: 87 Cumulative GPA Required: 2.0

Lower Division Core

Category Name: Computer Science Core Courses Rule: Must complete all of the following:courses

Criterion: C- Number of Credits 33

Course Listing

CSCI 106 Careers in Computer Science 1 F

CSCI 135 Fund of Computer Science I 3 F,S

CSCI 136 Fund of Computer Science II 3 F,S

CSCI 205	Programming Languages w/ C/C++	4	S
CSCI 232	Data Structures and Algorithms	4	F
CSCI 315E	Computers, Ethics, and Society	3	F
CSCI 323	Software Science	3	F
CSCI 332	Design/Analysis of Algorithms	3	S
CSCI 361	Computer Architecture	3	S
CSCI 426	Adv Prgrmng Theory/Practice I	3	F
CSCI 427	Adv Prgrmng Theory/Practice II	3	S

Commentary: 100-level CSCI courses other than CSCI 106, CSCI 135-136, and 200-level CSCI courses other than CSCI 205 and CSCI 232 do not count toward the degree or track requirements. However, they do count in the 60 credit limit in the major.

CSCI 315E will fulfill the upper division writing requirement.

Commentary: . Major Electives

Category Name: Degree Electives

Rule: Must complete 18 credits from the following courses

Criterion: C- Number of Credits 18

Course Listing

CSCI 340	Database Design	3
CSCI 390	Research	1 To 6
CSCI 391	Special Topics	1 To 6
CSCI 392	Independent Study	1 To 6
CSCI 394	Seminar	1 To 6
CSCI 398	Internship	1 To 3
CSCI 411	Advanced Web Programming	3
CSCI 412	Game and Mobile App	3
CSCI 438	Theory of Computation	3
CSCI 441	Computer Graphics Programming	3
CSCI 443	User Interface Design	3
CSCI 444	Data Visualization	3
CSCI 446	Artificial Intelligence	3
CSCI 447	Machine Learning	3
CSCI 448	Pattern Recognition	3
CSCI 451	Computational Biology	3
CSCI 460	Operating Systems	3
CSCI 466	Networks	3
CSCI 473	Cryptography	3
CSCI 477	Simulation	3
CSCI 478	Multimedia Data Processing	3
CSCI 490	Research	1 To 6
CSCI 491	Special Topics	1 To 6
CSCI 492	Independent Study	1 To 6
CSCI 494	Seminar	1 To 6
CSCI 498	Internship	1 To 3

CSCI 499 Senior Thesis/Capstone 1 To 6

Commentary: A total of at most 3 of the 18 credits of CS electives may be in CSCI 398 or 498.

Commentary: Other Courses

Category Name: Communication

Rule: Must complete 1 of the following courses

Criterion: C- Number of Credits 3

Course Listing

COMX 111A Intro to Public Speaking 3 F,S

COMX 242 Argumentation 3 F,S

Degree Specific Mathematics Category Name: Mathematics Rule: Take the following:

Criterion: C- Number of Credits 18

Course Listing

M 171 Calculus I 4 F,S

M 172 Calculus II 4 F,S

M 221 Introduction to Linear Algebra 4 F,S

M 225 Intro to Discrete Mathematics 3 F

STAT 341 Intro to Probability and Stat 3 F,S

Degree Specific Natural Sciences Category Name: Science Core

Rule: Must complete 1 of the following subcategories of science sequences Criterion: Number of Credits 9-10

Course Listing Commentary:

Subcategory Name: Biology

Rule: May complete the following sequence

Criterion: C- Number of Credits 9

Course Listing

BIOB 160N Principles of Living Systems 4 F,SU

BIOB 170N Princpls Biological Diversity 3 S,SU

BIOB 171N Princpls Biological Dvrsty Lab 2 S,SU

Subcategory Name: Chemistry

Rule: May complete the following sequence

Criterion: C- Number of Credits 10

Course Listing

CHMY 141N College Chemistry I 5 F,S

CHMY 143N College Chemistry II 5 S,SU

Subcategory Name: Physics

Rule: May complete the following sequence

Criterion: C- Number of Credits 10

Course Listing

PHSX 215N Fund of Physics w/Calc I 4 F

PHSX 216N Physics Laboratory I w/Calc 1 F

PHSX 217N Fund of Physics w/Calc II 4 S

PHSX 218N Physics Laboratory II w/Calc 1 S

Degree Specific Natural Sciences Category Name: Science Electives

Rule: Must complete 2 of the following courses

Criterion: C- Number of Credits 6-10

Course Listing

ASTR 131N	Elementary Astronomy I	3	F
ASTR 132N	Elementary Astronomy II	3	S
ASTR 134N	Elementary Astronomy Lab I	1	F
ASTR 135N	Elementary Astronomy Lab II	1	S
BIOB 160N	Principles of Living Systems	4	F,SU
BIOB 170N	Princpls Biological Diversity	3	S,SU
BIOB 171N	Princpls Biological Dvrsty Lab	2	S,SU
BIOM 250N	Microbiology for Hlth Sciences	3	S
BIOM 251	Microbiology Hlth Sciences Lab	1	S
CHMY 141N	College Chemistry I	5	F,S
CHMY 143N	College Chemistry II	5	S,SU
FORS 201	Forest Biometrics	3	F
GEO 101N	Intro to Physical Geology	3	F
GEO 102N	Intro to Physical Geology Lab	1	F
GEO 225	Earth Materials4	S	
PHSX 215N	Fund of Physics w/Calc I	4	F
PHSX 216N	Physics Laboratory I w/Calc	1	F
PHSX 217N	Fund of Physics w/Calc II	4	S
PHSX 218N	Physics Laboratory II w/Calc	1	S
PHSX 343	Modern Physics	3	F
PHSX 444	Advanced Physics Lab 3	S	

Commentary: The Biology, Chemistry, or Physics sequence chosen to fulfill the science core may not count toward the science electives requirement. Laboratory courses must be taken in conjunction with their associated lecture course.

College Humanities & Sciences Catalog Year: 2015-2016

Degree Type: Minor Level: Minor Subject: **Computer Applications (Minor)**

Total Credits: 21 Cumulative GPA Required: 2.0

Lower Division Core

Category Name: Computer Science Fundamentals Rule: Take 1 or both of the following courses

Criterion: C- Number of Credits 3-6

Course Listing

CSCI 100	Intro to Programming	3
CSCI 135	Fund of Computer Science I	3

Commentary: Other Courses

Category Name: Computer Science Electives

Rule: Complete at least 1 and no more than 3 of the following courses

Criterion: C- Number of Credits 3-9

Course Listing

CAPP 171	Communicating via Computers	3
CSCI 105	Computer Fluency	3

CSCI 172	Intro to Computer Modeling	3
CSCI 181	Web Design and Programming	3
CSCI 250	Computer Mdlng/Science Majors	3

Commentary: Other Courses

Category Name: Degree Electives

Rule: May complete remaining degree credits from the following courses for a total of 21 degree credits
 Criterion: C-
 Number of Credits 6-15

Course Listing

CSCI 135	Fund of Computer Science I	3
CSCI 136	Fund of Computer Science II	3
CSCI 191	Special Topics 0 To 6	
CSCI 205	Programming Languages w/ C/C++	4
CSCI 232	Data Structures and Algorithms	4
CSCI 291	Special Topics 1 To 6	
CSCI 391	Special Topics 1 To 6	
CSCI 444	Data Visualization	3
CSCI 491	Special Topics 1 To 6	

Commentary: Selection of CSCI 191, 291, 391, or 491 must be pre-approved by the advisor. CSCI 135 may not be counted toward 2 categories of requirements.

6 credits may be taken outside of the Computer Science department but must be pre-approved by the advisor.

Commentary: Degree Commentary

The minor in computer applications emphasizes use of applications such as programming languages, word processors, spreadsheets, and data bases in the management and manipulation of electronic information.

College Humanities & Sciences Catalog Year: 2015-2016

Degree Type: Minor Level: Minor Subject: **Computer Science (Minor)**

Total Credits: 21 Cumulative GPA Required: 2.0

Lower Division Core

Category Name: Computer Science Courses Rule: Must complete the following subcategories

Criterion: C- Number of Credits 18

Course Listing Commentary:

Subcategory Name: Fundamentals

Rule: Must complete all of the following courses

Criterion: Number of Credits 6

Course Listing

CSCI 135	Fund of Computer Science I	3
CSCI 136	Fund of Computer Science II	3

Subcategory Name: Minor Electives

Rule: Must complete 12 credits of electives

Criterion: C- Number of Credits 12

Commentary: In addition to the six credits of Fundamentals, students must select 12 credits of electives chosen from CS 181, CSCI 100, 250, 232, 205, 361 and courses numbered 300 and above with the restrictions: both CSCI 100 and 250 cannot be counted, and at least 6 credits of electives must be at the 300 level or above.

Commentary: Other Courses

Category Name: Mathematics

Rule: Must complete 3 credits of the following courses

Criterion: C- Number of Credits 3-6

Course Listing

M 115 Probability and Linear Math 3

M 121 College Algebra 3

M 122 College Trigonometry 3

M 151 Precalculus 4

Commentary: If M 121 is selected, it must be taken in conjunction with M 122 for a total of 6 credits.

Degree Commentary: The traditional minor in computer science emphasizes computer programming and related skills.

Department Faculty

Professor

- Ray Ford, Professor
- Joel Henry, Professor
- Jesse Johnson, Professor
- Yolanda Reimer, Professor

Associate Professor

- Douglas Raiford, Computer Science Department Chair, Bioinformatics, Modeling, Machine Learning, Pattern Recognition, Data Science

Assistant Professor

- Rob Smith, Assistant Professor
- Travis Wheeler, Assistant Professor

Lecturer

- Michael Cassens, Lecturer
- Mike O'Conner, Lecturer, Undergraduate Advisor

Emeritus

- Alden Wright, Emeritus Professor

Course Descriptions

Computer Applications

CAPP 171 - Communicating via Computers

Credits: 3. Offered every term. Prereq., previous computer experience or consent of instr. The use of the computer for information presentation and communication; emphasis placed on the use of electronic resources for the access, management, and presentation of information. Students taking CS classes with computer programming components should expect to use additional computer lab time outside of class.

Computer Science/Programming

CSCI 100 - Intro to Programming

Credits: 3. Offered autumn and spring. This course covers basic programming concepts such as variables, data types, iteration, flow of control, input/output, functions, and objects. The course will also cover programming ideas such as data structures, algorithms, modularity, and debugging. Students will learn about the role computation can play in solving problems by writing interesting programs to solve useful goals. No prior programming experience is expected. (Two hours independent lab per week.) Credit not allowed for both CSCI 100 and CSCI 110.

CSCI 104 - Programming with Alice

Credits: 1. Offered frequently. Classes are held for 2 hours/week in the first half of the semester. Introduction to object-oriented programming using a visual programming environment. Students create programs using drag-and-drop and these programs control animated on-screen characters and objects. Course is designed as a supplement to CSCI 135-136 which teaches object-oriented programming in a more traditional manner.

CSCI 105 - Computer Fluency

Credits: 3. Offered autumn and spring. Introduces the skills and concepts of information technology, both from practical and a more theoretical point of view. During lectures and interactive computer labs, students will explore a wide range of digital and information technologies, including common PC applications, networking, databases, privacy, and security. Credit not allowed for both CSCI 105 and CRT 111 and CS 111.

CSCI 106 - Careers in Computer Science

Credits: 1. Offered autumn. Exploration of various careers available in the general area of Computer Science. Includes discussion of strategies for success in the major. Computer Science faculty members also will discuss possible undergraduate research opportunities and motivation for graduate education.

CSCI 135 - Fund of Computer Science I

Credits: 3. Offered autumn and spring. Prereq., computer programming experience in a language such as BASIC, Pascal, C, etc.; CSCI 104 highly recommended as prereq. or coreq. Fundamental computer science concepts using the high level structured programming language, Java.

CSCI 136 - Fund of Computer Science II

Credits: 3. Offered autumn and spring. Prereq., CSCI 135; coreq., M 115 or M 151 or consent of instr. Continuation of CSCI 135. Survey of computer science topics including recursion, algorithms, basic data structures, operating systems, artificial intelligence, graphics, user interfaces, and social and ethical implications of computing.

CSCI 172 - Intro to Computer Modeling

Credits: 3. Offered autumn and spring. Problem solving and data modeling using computer productivity software. Emphasis using spreadsheets and database for data analysis. Credit not allowed for CSCI 172, CRT 172, and CS 172.

CSCI 181 - Web Design and Programming

Credits: 3. Electronic Publishing on the World Wide Web

CSCI 191 - Special Topics

Credits: 0 TO 6. (R-6) Offered intermittently. Prereq., consent of instr. Experimental offerings of visiting professors, experimental offerings of new courses, or one-time offerings of current topics. Students taking CS classes with computer programming components should expect to use additional computer lab time outside of class.

CSCI 192 - Independent Study

Credits: 1 TO 6. (R-6) Offered intermittently. Prereq., consent of instr. Students taking CS classes with computer programming components should expect to use additional computer lab time outside of class.

CSCI 198 - Internship

Credits: 1 TO 6. Offered intermittently. Prereq., consent of department. Extended classroom experience which provides practical application of classroom learning during placements on and off campus. Prior approval must be

obtained from the faculty supervisor and the Internship Services office. A maximum of 6 credits of Internship (198, 298, 398, 498) may count toward graduation. Course Attributes: Internships/Practicums

CSCI 205 - Programming Languages w/ C/C++

Credits: 4. Offered spring. Prereq., CSCI 232 and M 225. Concepts and principles of programming languages with an emphasis on C, C++, and object-oriented programming. Syntax and semantics of object-oriented languages. Principles and implementation of late binding, memory allocation and de-allocation, type-checking, scope, polymorphism, inheritance.

CSCI 216E - Technology, Ethics & Society

Credits: 3. An examination of ethical issues related to new technologies in the context of ethical theory in the western secular tradition. Focus will be on applying central concepts, principles, and problems of ethical theory to particular areas of technology, such as artificial intelligence and robotics, social networks, nanotechnology, genetic engineering, and privacy in a digital age. Course Attributes: Ethical & Human Values Course Writing Course-Intermediate

CSCI 232 - Data Structures and Algorithms

Credits: 4. Offered autumn. Prereq., CSCI 136; prereq. or coreq., M 225 or consent of instr. Abstract data types, recursion, linked lists, trees, hashing, graphs, and applications of data structures in algorithm development. Emphasis on object oriented programming techniques.

CSCI 250 - Computer Mdlng/Science Majors

Credits: 3. Offered autumn. Prereq., basic computer and spreadsheet literacy; coreq., M 162 or 171. An introduction to computer modeling in the sciences using spreadsheets and a programming language. Integrates principles of math, computer science and science. A student can take at most one of CSCI 172, CSCI 250, CRT 280, and CRT 281 for credit.

CSCI 291 - Special Topics

Credits: 1 TO 6. (R-9) Offered intermittently. Prereq., consent of instr. Experimental offerings of visiting professors, experimental offerings of new courses, or one-time offerings of current topics. Course Attributes: Writing Course-Lower-Division

CSCI 292 - Independent Study

Credits: 1 TO 6. (R-6) Offered intermittently. Prereq., consent of instr. Course material appropriate to the needs and objectives of the individual student.

CSCI 298 - Internship

Credits: 1 TO 6. (R-6) Offered intermittently. Prereq., consent of department. Extended classroom experience which provides practical application of classroom learning during placements on and off campus. Prior approval must be obtained from the faculty supervisor and the Internship Services office. A maximum of 6 credits of Internship (198, 298, 398, 498) may count toward graduation. Course Attributes: Internships/Practicums

CSCI 315E - Computers, Ethics, and Society

Credits: 3. Offered autumn. Prereq., WRIT 222 or university approved lower-division writing course and successful completion of the Upper-Division Writing Proficiency Assessment, or consent of instr. Ethical problems that computer scientists face. The codes of ethics of professional computing societies. The social implications of computers, computing, and other digital technologies. Course Attributes: Ethical & Human Values Course Writing Course-Advanced

CSCI 323 - Software Science

Credits: 3. Offered autumn. Prereq., CSCI 136. Study, implementation, and assessment of software processes, techniques, methods, and CASE tools. Project management and cost estimation techniques will be examined. A group project may be required.

CSCI 332 - Design/Analysis of Algorithms

Credits: 3. Offered spring. Prereq., CSCI 232 and M 225 or consent of instr. Algorithm design, analysis, and correctness. Commonly used algorithms including searching and sorting, string search, dynamic programming, branch and bound, graph algorithms, and parallel algorithms. Introduction to NP-complete problems.

CSCI 340 - Database Design

Credits: 3. Offered spring. Prereq., CSCI 232 or consent of instr. Fundamentals of data modeling, the relational mode, normal forms, file organization, index structures and SQL. Major project involving the design and implementation of a relational database.

CSCI 361 - Computer Architecture

Credits: 3. Offered spring. Prereq., CSCI 136 or consent of instr. Functional view of computer system components, BCPU, ALU, memory, bus, cache, I/O module. Instruction set design: formats, addressing modes. Basic circuit design. Pipelining and assembly language. Interrupt handling. Implementation of ALU and control unit. Detailed design of an RISC-like instruction set. Datapath and performance comparisons. Basic multiprocessor design.

CSCI 390 - Research

Credits: 1 TO 6. (R-6) Offered intermittently. Prereq., consent of instr. Directed individual research and study appropriate to the back ground and objectives of the student. Course Attributes: Research & Creative Schlrshp

CSCI 391 - Special Topics

Credits: 1 TO 6. (R-6) Offered intermittently. Prereq., junior standing. Experimental offerings of visiting professors, experimental offerings of new courses, or one-time offerings of current topics.

CSCI 392 - Independent Study

Credits: 1 TO 6. (R-6) Offered intermittently. Prereq., consent of instr. Course material appropriate to the needs and objectives of the individual student.

CSCI 394 - Seminar

Credits: 1 TO 6. (R-6) Offered intermittently. Prereq., consent of instr. Guidance in special work.

CSCI 398 - Internship

Credits: 1 TO 3. (R-3) Offered intermittently. Prereq., consent of department. Business or government internship. Prior approval must be obtained from faculty supervisor and the Internship Services office. Only three credits applicable to computer science major or minor. A maximum of 6 credits of Internship (198, 298, 398, 498) may count toward graduation. Course Attributes: Internships/Practicums

CSCI 411 - Advanced Web Programming

Credits: 3. Offered intermittently. Prereq., CSCI 136. Programming and software development techniques for developing web-based applications. Scripting and other programming languages that are used for web-based development.

CSCI 412 - Game and Mobile App

Credits: 3. Offered intermittently. Prereq., CSCI 232 and 323. Programming and software development techniques for developing gaming and mobile applications. Multiple gaming environments and mobile programming languages are introduced and examined to build modern applications.

CSCI 426 - Adv Prgrmg Theory/Practice I

Credits: 3. Offered autumn. Prereq., CSCI 205, 232, 323 and M 225, or consent of instr. Examination and implementation of modern best practices in the areas of software design, coding, testing and maintenance. Focus on design patterns and design pattern languages used to build modern software systems in a variety of areas.

CSCI 427 - Adv Prgrmg Theory/Practice II

Credits: 3. Offered spring. Prereq., CSCI 426. Design and implementation of a major software project in a group setting, with required documentation, presentation, installation, and approval by the instructor.

CSCI 438 - Theory of Computation

Credits: 3. Offered intermittently. Prereq., M 225 or M 307. This course focuses on understanding the limitations & capabilities of abstract models of computation, through rigorous mathematical analysis. Topics will include finite & pushdown automata, nondeterministic computation, regular expressions, generative grammars, Turing machines, undecidability, and computational complexity.

CSCI 441 - Computer Graphics Programming

Credits: 3. Offered intermittently. Prereq., CSCI 232 and M 221 or consent of instr. Hardware and software elements of graphics systems. Basic computer graphics algorithms for transformations, clipping, windowing and polygon filling. Straight line, circle generation. Parametrical representations of curves and surfaces. Three-D viewing. Hidden line and surface removal, shading and color models.

CSCI 443 - User Interface Design

Credits: 3. Offered intermittently. Prereq., CSCI 232 or consent of instr. Introduction to usability and key concepts of human behavior. Focus on the process of user-centered design, including requirements specification, prototyping, and methods of evaluation. Incorporation of regular design critiques of classmates' work, and emphasis on both oral and written communication skills. Credit not allowed for CSCI 543 and this course. Course Attributes: Co-Convened Course

CSCI 444 - Data Visualization

Credits: 3. Offered intermittently. Prereq., M 171; programming experience; and junior, senior, or graduate status; or consent of instr. Visualization fundamentals and applications using special visualization software; formulation of 3-D empirical models; translation of 3-D models into graphical displays; time sequences and pseudo-animation; interactive versus presentation techniques; special techniques for video, CD and other media.

CSCI 446 - Artificial Intelligence

Credits: 3. Offered intermittently. Prereq., M 225 or M 307, and CSCI 232, or consent of instr. Using computers and software to solve problems that require intelligence. Specific topics may include knowledge representation, logical and probabilistic reasoning, machine learning, planning, game playing, information retrieval, computer vision, and robotics.

CSCI 447 - Machine Learning

Credits: 3. Offered intermittently. Prereq., CSCI 232 or consent of instr. Introduction to the framework of learning from examples, various learning algorithms such as neural networks, and generic learning principles such as inductive bias, Occam's Razor, and data mining. Credit not allowed for both CSCI 447 and CSCI 547. Course Attributes: Co-Convened Course

CSCI 448 - Pattern Recognition

Credits: 3. Offered intermittently. Prereq., Junior or Senior status. Introduction to the framework of unsupervised learning techniques such as clustering (agglomerative, fuzzy, graph theory based, etc.), multivariate analysis approaches (PCA, MDS, LDA, etc.), image analysis (edge detection, etc.), as well as feature selection and generation. Emphasis will be on the underlying algorithms and their implementation. Credit not allowed for both CSCI 448 and CSCI 548. Course Attributes: Co-Convened Course

CSCI 451 - Computational Biology

Credits: 3. Offered Autumn. Designed for attendance by both computer scientists and biologists. The course will explore the importance of interdisciplinary partnerships between these two fields. Students will learn to use various existing computational tools for investigating genomic and other biological data. This will include tools for performing sequence alignments and searches, building phylogenetic trees, predicting RNA secondary structure, and predicting protein tertiary structure. The underlying algorithmic approaches taken by these tools will be discussed, and in some cases, actually implemented by the class participants. The course will examine the data repositories where genomic and other biological data are stored. There will be some light programming required using PERL as the language of choice. It is assumed that the class participants have no experience programming in PERL and will learn this skill as part of the course. Credit not allowed for CSCI 558 and this course. Course Attributes: Co-Convened Course

CSCI 460 - Operating Systems

Credits: 3. Offered autumn. Prereq., CSCI 232, or consent of instr. Operating system design principles. Processes, threads, synchronization, deadlock, memory management, file management and file systems, protection, and security, comparison of commonly used existing operating systems, writing programs that make use of operating system services. It is recommended, but not required, that the student also attend Programming Languages (in order to be prepared to write C programs) and Architecture (in order to understand interactions between the operating system and processor hardware) prior to attending this course.

CSCI 464 - Applications of Mining Big Data

Credits: 3. Offered intermittently. Prereq., upper division or consent of instr. Co-convenes with CSCI 564. Introduction to existing data mining software systems and their use, with focus on practical exercises. Topics include data acquisition, data cleansing, feature selection, and data analysis. Credit not allowed for both CSCI 464 and CSCI 564. Course Attributes: Co-Convened Course

CSCI 466 - Networks

Credits: 3. Offered spring. Prereq., CSCI 232. Concepts and practice of computer networking, network protocol layers, switching, routing, flow, and congestion control. Network programming.

CSCI 473 - Cryptography

Credits: 3. Prereq., CSCI 332 and either M 225 or M 307; or consent of instr. Theory and practice in modern cryptography. Statistical analysis of classical ciphers. Design practice of modern block ciphers and hash functions, and their theoretical justifications. Linear and differential cryptanalysis. Public-key cryptography based on number-theoretic problems. Zero-knowledge proofs and secure multi-party computation protocols. Credit not allowed for both CSCI 473 and CSCI 573.

CSCI 477 - Simulation

Credits: 3. Co-convene with CSCI 577. Prereq., M 172, CSCI 135, or consent of instr. Matrix languages. ODE solving; Euler-Richardson, Runge-Kutta, PDE solving; finite differences, finite elements, multi-grid techniques. Discrete methods for solution, renormalization group method, critical phenomena. Emphasis on presentation of results and interactive programs. Credit not allowed for CSCI 577 and this course. Course Attributes: Co-Convened Course

CSCI 478 - Multimedia Data Processing

Credits: 3. Offered intermittently. Prereq. CSCI 232 or consent of instr. Introduction to fundamental concepts of multimedia data. Focus on principles and techniques of multimedia data (image, audio, and video) processing and retrieval. Implementation of multimedia applications. Credit not allowed for CS 578 and this course. Course Attributes: Co-Convened Course

CSCI 480 - Applied Parallel Computing Techniques

Credits: 3. Prereq., CSCI 205 and 232, or instructor consent. This course is an introduction to parallelism and parallel programming. Topics include the various forms of parallelism on modern computer hardware (e.g. SIMD vector instructions, GPUs, multiple cores, and networked clusters), with coverage of locality and latency, shared vs non-shared memory, and synchronization mechanisms (locking, atomicity, etc). We will introduce patterns that appear in essentially all programs that need to run fast. We will discuss how to recognize these patterns in a variety of practical problems, discuss efficient algorithms for implementing them, and how to compose these patterns into larger applications. We will address computer architecture at a high level, sufficient to understand the relative costs of operations like arithmetic and data transfer. We also introduce useful tools for debugging correctness and performance of parallel programs. Assignments will include significant parallel programming projects. Co-convenes with CSCI 580. Credit not allowed for both CSCI 480 and CSCI 580. Course Attributes: Co-Convened Course

CSCI 490 - Research

Credits: 1 TO 6. (R-6) Offered intermittently. Prereq., consent of instr. Directed individual research and study appropriate to the back ground and objectives of the student. Course Attributes: Research & Creative Schlrshp

CSCI 491 - Special Topics

Credits: 1 TO 6. (R-6) Offered intermittently. Prereq., consent of instr. Experimental offerings of visiting professors, experimental offerings of new courses, or one-time offerings of current topics.

CSCI 492 - Independent Study

Credits: 1 TO 6. (R-6) Offered intermittently. Prereq., consent of instr. Course material appropriate to the needs and objectives of the individual student.

CSCI 494 - Seminar

Credits: 1 TO 6. (R-6) Offered intermittently. Prereq., consent of instr. Guidance in special work.

CSCI 498 - Internship

Credits: 1 TO 3. (R-3) Offered Intermittently. Prereq., consent of department. Business or government internship. Prior approval must be obtained from the faculty supervisor and the Internship Services office. Only three credits of CSCI 398 and/or CSCI 498 applicable to computer science major or minor. A maximum of 6 credits of Internship (198, 298, 398, 498) may count toward graduation. Course Attributes: Internships/Practicums

CSCI 499 - Senior Thesis/Capstone

Credits: 1 TO 6. (R-6) Offered every term. Prereq., consent of thesis/project director and chair of the Computer Science Department. Senior thesis for computer science majors and/or Watkins scholars.

CSCI 521 - IT Infrastructure

Credits: 3. Offered infrequently. Prereq., CSCI 446 or IS 372 or consent of instr. Identification and classification of background environment, hardware, software, and service components in an enterprise IT environment; management and security concerns for each component; consideration of how the components fit together to form an enterprise information technology environment. Level: Graduate

CSCI 531 - Desgn & Anal Algorithms

Credits: 3. Offered intermittently. Prereq., CSCI 332. Algorithm design, analysis, and correctness, with an emphasis on more advanced techniques than covered in CS 332. Design of algorithms by induction. Recurrences and their solutions. Parallel algorithms. Complexity theory: NP-hard and NP-complete problems. Approximation algorithms for intractable problems. Level: Graduate

CSCI 543 - Human-Computer Interaction

Credits: 3. Offered intermittently. Prereq., CSCI 232 or consent of instr. Principles of good design for interactive systems and web-based applications. User-centered design methodology including requirements specification, low and high-fidelity prototyping, heuristic evaluation, cognitive walkthrough, predictive modeling, and usability testing. Advanced HCI research project. Credit not allowed for both CSCI 443 and CSCI 543. Level: Graduate Course

Attributes: Co-Convened Course

CSCI 547 - Machine Learning

Credits: 3. Offered intermittently. Prereq., CSCI 232 or consent of instr. Fundamentals of machine learning including neural networks, decision trees, Bayesian learning, instance-based learning, and genetic algorithms; inductive bias, Occam's razor, and learning theory; data mining; software agents. Credit not allowed for CSCI 447 and CSCI 547.

Level: Graduate Course Attributes: Co-Convened Course

CSCI 548 - Pattern Recognition

Credits: 3. Offered intermittently. Introduction to the framework of unsupervised learning techniques such as clustering (agglomerative, fuzzy, graph theory based, etc.), multivariate analysis approaches (PCA, MDS, LDA, etc.), image analysis (edge detection, etc.), as well as feature selection and generation. Techniques in exploratory data analysis when faced with large, multivariate datasets. Opportunities at implementation of some algorithmic approaches as well as use of preexisting tools such as the R-project statistics package. Emphasis will be on the underlying algorithms and their implementation. Credit not allowed for both CSCI 448 and CSCI 548. Level:

Graduate Course Attributes: Co-Convened Course

CSCI 555 - Topics Artificial Intelligence

Credits: 3. Offered intermittently. Prereq., M 225 or M 307, and CSCI 232, or consent of instr. The study and design of artificial intelligent agents. Specific topics may include knowledge representation, logical and probabilistic reasoning, machine learning, planning, game playing, information retrieval, computer vision, and robotics. Level: Graduate

CSCI 558 - Intro to Bioinformatics

Credits: 3. Offered autumn. Prereq., consent of instr. Introduction and use of biological data sources available in the post human genome project era. Topics include basic algorithms for alignment of genome sequences and prediction of protein structures, as well as more advanced representational and algorithmic issues in protein structure, genome sequence computation, and systems biology. Discussion of state of the art bioinformatics projects that are being developed between the Department of Computer Science and the School of Pharmacy.

Level: Graduate Course Attributes: Co-Convened Course

CSCI 564 - Applications of Mining Big Data

Credits: 3. Offered intermittently. Co-convenes with CSCI 464. Introduction to existing data mining software systems and their use, with focus on practical exercises. Topics include data acquisition, data cleansing, feature selection, and data analysis. Credit not allowed for both CSCI 464 and CSCI 564. Level: Graduate Course Attributes: Co-Convened Course

CSCI 565 - Database Systems

Credits: 3. Offered intermittently. Prereq., CSCI 205 and 340, or consent of instr. Relational database theory, data models, query languages, transaction processing, security, and concurrency. Level: Graduate

CSCI 573 - Cryptography

Credits: 3. Prereq., CSCI 332 and either M 225 or M 307; or consent of instr. Theory and practice in modern cryptography. Statistical analysis of classical ciphers. Design practice of modern block ciphers and hash functions,

and their theoretical justifications. Linear and differential cryptanalysis. Public-key cryptography based on number-theoretic problems. Zero-knowledge proofs and secure multi-party computation protocols. Credit not allowed for both CSCI 473 and CSCI 573. Level: Graduate

CSCI 577 - Simulation Modeling

Credits: 3. Co-convene with CSCI 477. Prereq., M 172, CSCI 135, or consent of instr. Matrix languages. ODE solving; Euler-Richardson, Runge-Kutta, PDE solving; finite differences, finite elements, multi-grid techniques. Discrete methods for solution, renormalization group method, critical phenomena. Emphasis on presentation of results and interactive programs. Conduct, document, and present graduate level research involving computer simulation methods. Credit not allowed for CSCI 477 and this course. Level: Graduate Course Attributes: Co-Convened Course

CSCI 578 - Multimedia Systems

Credits: 3. Offered intermittently. Prereq. CSCI 232 or consent of instr. Introduction to fundamental concepts of multimedia data. Focus on principles and techniques of multimedia data (image, audio, and video) processing and retrieval. Implementation of multimedia applications. Credit not allowed for CSCI 478 and this course. Level: Graduate Course Attributes: Co-Convened Course

CSCI 580 - Applied Parallel Computing Techniques

Credits: 3. Offered intermittently. Prereq., CSCI 232, 205. Parallel processing architectures and programming languages. Co-convenes with CSCI 580. Credit not allowed for both CSCI 480 and CSCI 580. Level: Graduate Course Attributes: Co-Convened Course

CSCI 594 - Graduate Seminar

Credits: 1 TO 6. (R-6) Offered intermittently. Prereq., consent of instr. Seminar on current research topics in computer science. Level: Graduate

CSCI 595 - Special Topics

Credits: 1 TO 6. (R-6) Offered intermittently. Prereq., consent of instr. Experimental offerings of visiting professors, experimental offerings of new courses, or one-time offering of current topics. Level: Graduate Course Attributes: Internships/Practicums

CSCI 596 - Independent Study

Credits: 1 TO 6. (R-6) Offered intermittently. Prereq., consent of instr. Course material appropriate to the needs and objectives of the individual student. Level: Graduate Course Attributes: Service Learning/Volunteer

CSCI 597 - Research

Credits: 1 TO 6. (R-6) Offered intermittently. Prereq., consent of instr. Directed individual research and study appropriate to the back ground and objectives of the student. Level: Graduate

CSCI 598 - Internship

Credits: 1 TO 9. (R-3) Offered intermittently. Prereq., consent of department. Business or government internship. Prior approval must be obtained from faculty supervisor and the Internship Services office. Only three credits applicable to computer science major or minor. Level: Graduate Course Attributes: Internships/Practicums

CSCI 599 - Thesis/Project

Credits: 1 TO 6. (R-6) Offered every term. Prereq., consent of instr. Research for and preparation of the master thesis or professional paper. Level: Graduate

East Asian Studies

Undergraduate Degrees Available

College Humanities & Sciences Catalog Year: 2015-2016

Degree Type: Bachelor of Arts Level: Major Subject: **East Asian Studies**

Total Credits: 44 Cumulative GPA Required: 2.0

Lower Division Core