MAJOR
Software Engineering (SE) is all around us. The IT industry is a diverse field impacting virtually every business – from the service industry and trucking companies to manufacturing specialists and health care professionals and from large companies to small businesses. As the industry changes and matures, new technologies and applications are being developed that have the potential to create opportunities as well as challenges for North Dakota’s IT industry. At VCSU, we meet those challenges head on by preparing our students with the necessary tools and skill sets they will need to be successful in an ever-changing technological work environment. SE is a challenging and rewarding major for students. It completes a full spectrum of VCSU offerings that prepare graduates to succeed in computer systems and software engineering positions in North Dakota and beyond.

Do yourself a favor – go to www.code.org and watch the video. You don’t have to be a genius, you just have to be determined. You could be the next Mark Zuckerberg (Creator of Facebook®) or Jack Dorsey (Creator of Twitter®). Let that dream become a reality at Valley City State University.

PROGRAM DELIVERY & CURRICULUM
Courses will be offered both traditionally in the classroom as well as through IVN. Most classes are face-to-face, which is a feature of the Software Engineering major. The curriculum for the SE major was developed using the Software Engineering Education Knowledge (SEEK) standards developed by the Joint Task Force on Computing Curricula (IEEE Computer Society and the Association for Computing Machinery, 2004). This program provides a rigorous, high quality educational program and prepares students to be readily employable, technically skilled, life-long learners.

QUOTE
“I owe VCSU a whole lot for helping me get where I am today, which is having the opportunity to do something I really enjoy every day.”

~Ryan McCulloch, Microsoft Developer

WHY HERE?
The Software Engineering major at VCSU is the only of its kind in the North Dakota University System. VCSU’s Software Engineering degree offers design to documentation and everything in between. Associates from Microsoft, Bobcat, and other employers attend recruiting events on our campus, which can lead to opportunities for our students.

CAREER OPPORTUNITIES
A Software Engineering degree will contribute to a larger IT workforce in North Dakota. The skills graduates gain focus on the business knowledge and communication skills needed to analyze requirements and manage projects that use information systems to solve business problems. The 2013 Edition of the State of the IT Industry Guide, produced by the Information Technology Council of North Dakota, outlines the projection for an increase in several occupations including computer software engineers (applications) with a projected increase of 20% for the next decade.

Students with an SE degree can become IT project managers, business analysts, systems analysts, software developers, and more. For more information on what can be done with an SE degree, watch the videos at www.code.org. According to the U.S. Bureau of Labor and Statistics, an analysis of employment opportunities in STEM-related fields indicates the strongest outlook for computing jobs, with software engineering offering the largest number of potential jobs within that field.
Software Engineering
Composite Major

MAJOR
The Software Engineering (SE) major is designed to attract students interested in solving problems using software solutions to meet the needs of employers in the region. The SE major focuses on software engineering skills required by employers to ensure students are well-prepared to enter the workforce. Many of the courses required for this major are offered in the Computer Information Systems (CIS) and Computer Science programs. Movement between the SE and CIS majors, which share a subset of courses, will be reasonably seamless. Nontraditional IT majors may be interested in Software Engineering more so than traditional Computer Science or CIS majors because of the inclusion of humanistic issues such as project management, requirements gathering, and human computer interaction.

LEARNING OUTCOMES
1. Able to effectively understand requirements, design solutions, and develop software to successfully implement software.
2. Able to persevere and analyze in-depth problems until a final solution is identified.
3. Be creative and think outside of the box while designing solutions for unique problems.
4. Communicate effectively with stakeholders during all phases of a project.
5. Identify the impacts of changes and effectively implement solutions involving integration with other systems.
6. Able to manage small, simple projects and work in high performing teams to complete projects successfully.
7. Adjust to the corporate culture in a particular work environment by adhering to expectations in an ethical manner.

ABILITIES
Collaboration To work together to reach a common goal.
Communication To convey thoughts, ideas, data, information, and messages effectively.
Global Awareness To look beyond one’s immediate self and local community.
Problem Solving To select and use appropriate and effective approaches and tools in solving a wide variety of problems.
Technology Use technological tools and processes to improve learning, productivity, and/or performance.
Effective Citizenship To be actively involved in improving the community and environment.
Aesthetic Engagement To develop an increased understanding and appreciation of creative human endeavor.

For degree and graduation requirements see pages 39-40.

Department Chair
Susan Peifer, M.S., PMP
McFarland Hall 138A
(701) 845-7719

General Education Requirements 39 Hours
Communication & Collaboration 9 Hrs
ENGL 110 College Composition I 3
ENGL 120 College Composition II 3
- or - ENGL 125 Intro to Professional Writing 3
COMM 110 Fund of Public Speaking 3
- or - COMM 212 Interpersonal Communication 3
- or - COMM 216 Intercultural Communication 3

Problem Solving 11 Hrs
Mathematics (select one course) 3 Hrs
MATH 103 College Algebra 3
MATH 104 Finite Mathematics 3
MATH 107 Precalculus 3
MATH 165 Calculus I 4
Lab Science - 8 crs (select two courses)
BIOL 111, 150, 151, 170, 220, 221
CHEM 115, 116, 121, 122
PHYS 100, 110, 161, 162, 251, 252
TECH 161

Technology 3 Hrs
(CIS 170 Intro to Computer Info Systems)
CSCI 127 Intro to Prog in JAVA

Wellness 2 Hrs
HPER 100 Concepts Fitness & Wellness

Aesthetic Engagement 6 Hrs
Literacies - 3 crs (Select one course)
ENGL 220, 225, 241, 242, 261, 262
HUM 201 Civil, Thought, & Lit Heritage
SPAN 201 2nd Yr I; SPAN 202 2nd Yr II
THEA 110 Intro Theatre; THEA 161 Acting I
Art & Music - 3 crs (Select one course)
ART 110 Introduction to Visual Arts
HUM 202 Fine Arts & Aesthetics
MUS 100 Music Appreciation

Global Awareness & Effective Citizenship 6 Hrs
ECON 201 Principles of Micro * 3
PSYC 111 Intro Psysc * 3

Additional General Education 2 Hrs
Select one additional course from the area of Aesthetic Engagement or Global Awareness or
ART 112 (3), ART 231 (3), ART 281 (3), GEOG 111 (2), MUS 104 (1), MUS 105 (1), MUS 131 (1), MUS 141 (1), PHYS 275 (1), THEA 201 (1-3)

Required Courses 58 Hours
CIS 128 Microcomputer Hardware I 3
CIS 164 Networking Fundamentals 3
COMM 360 Group Dynamics 3
CSCI 160 Intro to Struct Prog I 3
CSCI 161 Intro to Struct Prog II 3
MATH 208 Discrete Structures 3
MATH 321 Applied Prob & Stats 3
SE 201 Intro to Software Engineering 3
SE 211 Software Construction 3
SE 212 SE App to Human Comp Inter 3
SE 242 Data Structures 3
SE 311 Software Design & Architecture 3
SE 321 Software Quality Assurance & Testing 3
SE 370 Social Implications of Computers 3
SE 379 Computer Org & Systems 3
SE 380 Systems Analysis&Design 3
SE 381 Project Management 3
SE 385 Database Theory/Design 3
SE 480 Capstone 3
SE 491 Senior Portfolio 1

Directed Electives-Specialty 12 Hrs
Option 1: Enterprise Systems
CIS 369 Enterprise Systems 3
CIS 371 Enterprise Systems II 3
CIS 475 Integration of Busi Processes in SAP ERP 6

Option 2: Science
12 credits of major only science courses and approval from advisor. Possible options include: BIOL 150, BIOL 151, BIOL 170 or PHYS 251/L, PHYS 252/L, PHYS 294, PHYS 394.

Additional specialties may be chosen with advisor approval. Please consult with your advisor.

Total General Education 39 Hrs
Total Major Requirement 70 Hrs
Total Credits Needed to Graduate 120 Hrs