Student Learning Assessment Report (SLAR)

Instructions: This template is a running document of each annual Academic Program Assessment Report due to the department chairs and Provost the last Friday in October. The final report in the document should be the official report of the year of the full Program Review. All reports below use the same report template. If the report is the Program Review year, please indicate it next to "Program Review Year" and also submit the Academic Program Review (APR).

Department: Natural and Applied Sciences

Academic Program Evaluated: Computer Science **Program Review Year:**

	Year 1 **Academic Year: 2016-2017**	Year 2 **Academic Year: 2017-2018**	Year 3 **Academic Year: 2018-2019**	Year 4 **Academic Year: 2019-2020**
Faculty members involved in this assessment process: (List all faculty members who participated: program coordinator, reviewers, committee members, etc.)	Artifact Assessors: 1. Douglas Mitcham, Assoc. Professor of Computer Science 2. Jeremy Harris, Asst. Professor of Computer Information Systems 3. Don Tosh, Professor of Mathematics		Artifact Assessors: 1. Douglas Mitcham, Assoc. Professor of Computer Science 2. Jeremy Harris, Asst. Professor of Computer Information Systems 3. Don Tosh, Professor of Mathematics	

Number of students in sample: **(If known, supply the number of students in each class/year who were used in the assessment report.)**	Freshmen: 4 Sophomores: 7 Juniors: 6 Seniors: 6 Graduate: 0 (These are CPSC major numbers, not sample size)	Freshmen: Sophomores: Juniors: Seniors: Graduate:	Freshmen: 4 Sophomores: 5 Juniors: 6 Seniors: 10 Graduate: 0 (These are CPSC major numbers, not sample size)	Freshmen: Sophomores: Juniors: Seniors: Graduate:
Instrument(s) used in assessment: **(List the exams, standardized tests, portfolios, etc. that were used in the assessment process.)**	Using 4 point scale rubrics, assessors scored student work on instruments in Course Commons. The instruments used for each program outcome are as follows: Ia MATH 212 algorithm test Ib HOL program Ic CPSC 211 algorithm lab Id CPSC 493 project grades IIa CPSC 215 program IIb CPSC 225 homework IIc CPSC 231 aux. storage quiz IId CPSC 225 quizzes IIIa CPSC 441 homework IIIb CPSC 415 homework IVa CPSC 231 team project IVb CPSC 441 paper IVc CPSC 415 oral report IVd CPSC 415 paper		Using 4 point scale rubrics, assessors scored student work on instruments in Course Commons. The instruments used for each program outcome are as follows (with sample size n): Ia MATH 212 algorithm test (n = 13) Ib HOL program (n = 7) Ic CPSC 211 algorithm lab (n = 11) Id CPSC 493 project grades (n = 6) IIa CPSC 215 program (n = 5) IIb CPSC 225 homework (n = 0) IIc CPSC 231 aux. storage quiz (n = 0) IId CPSC 225 quizzes (n = 0) IIIa CPSC 441 homework (n = 5) IIIb CPSC 415 homework (n = 10) IVa CPSC 231 team project (n = 0)	

			IVb CPSC 441 paper (n = 4) IVc CPSC 415 oral report (n = 10) IVd CPSC 415 paper (n = 10)	
Additional Data: (List any additional information/data that informed this report.)	14 portfolios containing all of the above instruments were evaluated		Evaluations were done for entire classes, rather than just the CPSC majors, as was previously done. Evaluations include all courses from FA18 through SP19. In the reporting of results **NA** (Not Available) indicates that the class exercising the assessment instrument was not offered during the 2018/2019 school year (or scores unavailable). The sample size for these items are listed as n = 0 above.	
Methodology: **(Explain the method of data collection and the data analysis process.)**	Using 4 point scale rubrics, assessors scored student work on instruments above in Course Commons. Data were compiled for each PLO and summarized. **mean scores on a scale of 1-4; 3+ considered proficient**		Using 4 point scale rubrics, assessors scored student work on instruments above in Course Commons. Data were compiled for each PLO and summarized. **mean scores on a scale of 1-4; 3+ considered proficient**	
Results of Assessment: **(List the findings in summary format as narrative.)**	Although several areas showed strong results, the communication skill components of peer collaboration and oral presentation scored		Capstone project scores remained exceptionally high (and even improved) with the exception of the requirements phase, which dropped to 2.8.	

	exceptionally high.		Communication skills remained high and even improved. Algorithm analysis (Ia) remained at 2.8. The process synchronization component of IIIb rose from 2.9 to 3.9. Outcome IIa (Practical application of computer architecture and system hardware) rose from 3.3 to 4.0.	

Data: **(Provide the graphs, charts, etc. that were used to show data results. Do not include the actual data.)**	**Results of Assessment (mea scores on a scale of 1-4; 3+ considered proficient)** I Algorithm Development & Implementation Ia Analysis 2.8 Ib Implementation 3.5 Ic Development, implementation, and analysis 3.7 Id Capstone: - Proposal 4.0 - Requirements 3.6 - Design 3.3 - Code 3.7		**Results of Assessment (mea scores on a scale of 1-4; 3+ considered proficient)** I Algorithm Development & Implementation Ia Analysis 2.8 Ib Implementation 3.0 Ic Development, implementation, and analysis 3.1 Id Capstone: - Proposal 4.0 - Requirements 2.8 - Design 3.5 - Code 4.0	

	- Demo 3.7 - Overall project: 3.6 II Computer Architecture & System Hardware IIa Practical application 3.3 IIb Practical knowledge: - Digital logic, circuits, and concept. machines 3.7 - Basic architect. 3.8 - Addressing 3.8 - The Processor 3.6 - I/O Org. 3.4 IIc Storage device knowledge 3.1 IId Computer component knowledge: - Digital logic, circuits, concept. machines 3.1 - Basic architect. 2.7 - Addressing 2.4 - The processor 2.9 - I/O Org. 3.1 - Memory 2.6		- Demo 4.0 - Overall project: 3.7 II Computer Architecture & System Hardware IIa Practical application 4.0 IIb Practical knowledge: - Digital logic, circuits, and concept. machines NA - Basic architect. NA - Addressing NA - The Processor NA - I/O Org. NA IIc Storage device knowledge NA IId Computer component knowledge: - Digital logic, circuits, concept. machines NA - Basic architect. NA - Addressing NA - The processor NA - I/O Org. NA - Memory NA	

	III System Software IIIa Database Software: - Overview of DB management 3.2 - DB system architecture 3.6 - Intro to relational databases 3.7 - Intro to SQL 3.5 - Types 3.2 - Relations 3.5 - Relational algebra 3.5 - Relational calculus 3.9 - Integrity 3.5 - Views 3.7 - FDs and normalization through BCNF 3.3 - Higher normal forms, semantic modeling 3.3 - Recovery and concurrency 3.4 IIIb Operating system software: - Introduction 3.8 - OS structures 3.4 - Processes 3.3 - Threads 3.5 - CPU scheduling 3.6 - Process		III System Software IIIa Database Software: - Overview and evolution of DB management 3.6 - Data Models 3.4 - Intro to relational databases 3.4 - ER Modeling 3.0 - Advanced modeling 3.6 - Normalization 3.4 - Intro to SQL 4.0 - Advanced SQL 4.0 IIIb Operating system software: - Introduction 3.5 - OS structures 3.9 - Processes 3.3 - Threads 3.3 - CPU scheduling 3.0 - Process	

	synchronization 2.9 - Deadlocks 3.2 - Main memory 3.3 - Virtual memory 3.6 - File system interface and implementation 3.9 - Mass storage structure 3.4 - I/O systems 3.3 - Protection and security 3.8 IV Communication Skills IVa Peer collaboration 3.9 IVb DB research written comm. 3.6 IVc Research oral comm. OS: - Use of visual aids 3.5 - Eye contact 4.0 - Not reading notes verbatim 4.0 - Technically understood 4.0 - Clear, audible, non-distractive speaking 3.8 - Optimal length 3.8 - Overall presentation: 3.8 IVd OS research written comm. 3.3		synchronization 3.9 - Deadlocks 3.9 - Main memory 3.4 - Virtual memory 3.4 - File system interface and implementation 3.5 - Mass storage structure 3.7 - I/O systems 3.7 - Protection and security 3.9 IV Communication Skills IVa Peer collaboration NA IVb DB research written comm. 3.5 IVc Research oral comm. OS: - Use of visual aids 4.0 - Eye contact 3.9 - Not reading notes verbatim 3.9 - Technically understood 4.0 - Clear, audible, non-distractive speaking 4.0 - Optimal length 4.0 - Overall presentation: 4.0 IVd OS research written comm. 3.8	

Strengths: **(From the findings, list the areas of strengths that currently exist in the academic program.)**	Although several areas showed strong results, the communication skill components of peer collaboration and oral presentation scored exceptionally high.		Although several areas showed strong results, the communication skills (written and oral) remained exceptionally high, some scoring even higher than the previous assessment. All components of the capstone project (Id) scored higher except for the requirements phase. Outcome IIa rose to 4.0 from 3.3. This is the practical application of computer architecture and system hardware being assessed by an assembler program.	
Areas in need of improvement: **(From the findings, list the areas of weakness(s) that currently exist in the academic program.)**	Algorithm analysis (Ia) scored lower and would be one area to focus on. Computer component knowledge (IId) also scored		Algorithm analysis (Ia) remained at 2.8 from the last assessment, short of the 3.0 goal. The requirements phase of	

	lower than other areas and should be addressed.		the capstone project (Id) dropped from 3.6 to 2.8, short of the 3.0 goal. (All other outcomes that were assessed scored a 3.0 or greater. It should also be noted that CPSC 441 (Database Systems) (IIIa) homework was recategorized based on revamping of that course and the use of a newer text. All scores were 3.0 or higher)	

Year 1 (2016 – 2017):

Plans for improvement: **(Provide the improvement plan, when it will be implemented, and person who will administer the improvement plan.)**

*If an A.A. degree is part of this program, describe how the changes to this program affect the A.A. degree, if any.

Plan for Improvement	Timeline	Responsible Person
Devote more time to algorithm analysis and present more examples (in both MATH 212 and CPSC 211)	Changes to be implemented for MATH 212 and CPSC 211 in the SP17 semester	Doug Mitcham
Devote more time in CPSC 225 to covering the circuitry and intracacies of computer components. Possibly enhance these lectures with video clips or other learning aids	Changes to be implemented for CPSC 225 in the SP18 semester (CPSC 225 is offered in the spring of even years)	Doug Mitcham

Year 1 (2016 – 2017):

Improvements made: **(List completed improvement plans and dates of actual implementation.)**
If an A.A. degree is part of this program, describe how the changes to this program affect the A.A. degree, if any.

- Prior assessments showed students doing poorly on software design activities. Added design assignments and added time discussing design were incorporated primarily into CPSC 111 (FA16) and CPSC 211 (SP17). More design examples were shown in CPSC 493 (SP16) and a higher weight was given to the design phase in that course. The design phase of the senior project now scored a 3.3 and is on an upward trend.

- Prior assessments showed students scoring poorly with regard to machine addressing. More time was devoted to this subject in the CPSC 225 class and more examples covered (SP16). The practical knowledge component (IIb) scored 3.8 on this assessment. This is a significant improvement. It should be noted, however, that addressing within the computer component outcome (IId) scored 2.4 and is part of the improvement plan specified above.

- Prior assessments showed students scoring poorly of various aspects of their oral communication. Corrective actions were made and this area is listed above as a strength for this current assessment (FA16).

- Student feedback indicated a desire to have more 'hands-on', interactive learning for some classes. The database class was completely revamped in the FA16 semester to include the use of MS SQL Server to build a database and do 'hands-on' SQL training with it. This is a valuable experience/knowledge students can put in their resumes, making them an attractive candidate for employment in that field. Other changes are being considered for courses in the major.

- Electives have been, and are being, added to the program to cover additional material beneficial and interesting to the students. Past courses include Data Communications (required for CIS majors and an elective for CPSC majors) and Java Programming. Mobile App Development and Security courses are planned for the upcoming semesters (FA17, SP18).

- Student support and interaction has been enhanced with the development of an equipped collaboration room for students to use. Other enhancements are currently being developed including the formation of a student chapter of ACM (with the valuable activities and support services it will provide) as well the development/promotion of internships (FA17).

Year 2 (2017 – 2018):

Plans for improvement: **(Provide the improvement plan, when it will be implemented, and person who will administer the improvement plan.)**
*If an A.A. degree is part of this program, describe how the changes to this program affect the A.A. degree, if any.

- Although no assessment report and analysis was done for this academic year, assessment activities such as peer review, student feedback, and self-evaluation did continue, leading to the improvements specified below.

Year 2 (2017 – 2018):

Improvements made: **(List completed improvement plans and dates of actual implementation.)**
*If an A.A. degree is part of this program, describe how the changes to this program affect the A.A. degree, if any.

- The **Intro to Cybersecurity** course was developed and taught in the SP18 semester. The importance of this subject area in industry called for this course to be added to the program (currently as an elective, but is now mandatory for the CIS program). It satisfies the recommendations of the ACM/IEEE Computer Science Curricula (specifically, the Information Assurance and Security (IAS) knowledge area). Student feedback was positive with the security exercises being popular.

- A 5 week online version of the cybersecurity course was developed (and taught in the FA18 semester) for the Adult Studies program. Although the online enrollment was small, feedback was extremely positive. Approximately 200 hours were spent in the development of this online course.

- As a second HOL, Visual Basic is being phased out and replaced with the Java programming language. Visual Basic is becoming outdated and Java is very popular with industry as well as academic institutions. It will help with graduate employability and in the past, has been needed for some going to graduate school. The first time Java was taught was the FA15 semester.

- After attending the ACM SIGCSE (Special Interest Group on Computer Science Education) Symposium in Seattle, WA, zyBooks were used in the CPSC 111 (FA17) and CPSC 211 (SP18) classes. These are on-line, interactive texts that are accessible from any browser and are much less expensive than the hardcopy texts previously used. They include online exercises and coding, eliminating the need for separate lab sessions done previously. They prove to be very effective and popular with the students. Additionally, our outside programming environment was also continued (MS Visual Studio).

Year 3 (2018 – 2019):

Plans for improvement: **(Provide the improvement plan, when it will be implemented, and person who will administer the improvement plan.)**
*If an A.A. degree is part of this program, describe how the changes to this program affect the A.A. degree, if any.

Plan for Improvement	Timeline	Responsible Person
For outcome Ia, continue to devote more time to algorithm analysis and present more examples (in both MATH 212 and CPSC 211). Look at the effectiveness of the examples that have been given previously to see if better examples are needed. In-class exercises should be considered.	Changes to be implemented for SP21 MATH 212 and SP20 CPSC 211 classes.	Doug Mitcham
For outcome Id, show more examples of requirements to students doing their capstone project and spend more time explaining them. Emphasize the importance of the requirements phase when discussing the software life cycle in CPSC 211, perhaps with examples.	Changes to be implemented for SP20 CPSC 211 and CPSC 493 (capstone) classes.	Doug Mitcham

Year 3 (2018 – 2019):

Improvements made: **(List completed improvement plans and dates of actual implementation.)**
*If an A.A. degree is part of this program, describe how the changes to this program affect the A.A. degree, if any.

- As a result of a prior peer review suggestion, transparencies used in CPSC classes (primarily the CPSC 231 File Processing class) have been converted to powerpoints, accessible for students through Course Commons. (FA18)

- Work has begun on creating a 5 week online version of the CPSC 225 (Computer Hardware Organization) course. Improvements were made to the existing cybersecurity online course. (FA18)

- The process synchronization component of IIIb (Operating System Software) rose from 2.9 to 3.9 due to changes in the FA18 semester.

- From the previous assessment, 4 components of IId (computer component knowledge) were short of the 3.0 goal. These covered basic computer architecture, memory and memory addressing, and the processor. These areas will be addressed in the upcoming SP20 CPSC 225 (Computer Hardware Organization) course.

- CPSC 497 (Internship) is being added as a program requirement starting with incoming majors for the FA19 semester. More opportunities are arising for student internships (and being done) and more relationships are being fostered with local businesses. This is proving to be valuable experience for our students, enhancing their employability and practical knowledge (applying classroom knowledge to real-world environments). It also has shed a favorable light on Evangel's CPSC program since our interns have performed extremely well. Half of the internship grade is provided by the intern's Supervisor and all interns have received either an A or A-.

Year 4 (2019 – 2020):

Plans for improvement: **(Provide the improvement plan, when it will be implemented, and person who will administer the improvement plan.)**
*If an A.A. degree is part of this program, describe how the changes to this program affect the A.A. degree, if any.

Plan for Improvement	Timeline	Responsible Person

Year 4 (2019 – 2020):

Improvements made: **(List completed improvement plans and dates of actual implementation.)**
*If an A.A. degree is part of this program, describe how the changes to this program affect the A.A. degree, if any.