ACADEMIC PROGRAM REVIEW (APR)
Applied Sciences and Sustainability
(Part A)
"Are we teaching the right things?"

SECTION 1: Introduction

1. **Department:** Natural & Applied Science
Academic Program: Applied Sciences and Sustainability
Program Coordinator: Michael Tenneson, Jason Streubel
Academic Year of Review: 2019-2020

2. Program Description: This program Integrate students' desire to help the needy with your interest in the environment to prepare the student for a career in sustainability, conservation, ecology, or field research. Curriculum that includes environmental biology, ecology, botany, chemistry, compassion. Students select their academic plan from two track options. The Compassion track is focused on building awareness of and knowledge in the sociological elements of applied science and sustainability. This includes an emphasis on social enterprise and community relief and development.
The Environmental Science track is designed for those planning to pursue technical aspects of the field and who are interested in gaining experience in a wide range of inter-disciplinary sciences. This track would be the preferred plan for those interested in pursuing a science-based advanced degree.

3. The following faculty teach one or more courses in the discipline:
Dr. William Cook (BA Mathematics, MA Mathematics, MS Electrical and Computer Engineering, MS Chemistry, PhD Chemistry)
Mrs. Erica Harris (BS Biology, MS Biology)
Dr. Nicholas Hestand, (BS Chemistry, BS Mathematics, PhD Chemistry)
Dr. Jonathan LeCureux (BS Biology, PhD Microbiology)
Mrs. Julie Mayne (BS Biology, MS Biology, EdD Candidate)
Dr. Michael Tenneson (BA Biology, MS Biology, MA Missiology, PhD Science Education)

4. Stakeholders: The primary stakeholders are the students participating in the program. Other stakeholders are the schools that will hire our graduates. Finally the students taught by our graduates are also stakeholders.

SECTION 2: Identity: Mission, Values and Strategic Plan

5. Advancing the Mission: Evangel University's mission statement is as follows:

"Evangel University is a comprehensive Christian university committed to excellence in educating and equipping students to become Spirit-empowered servants of God who impact the Church and society globally."

Evangel has identified the following goals:

1) Lead academic innovation (academic excellence)
2) Nurture spiritual vitality (spiritual vitality)
3) Expand our reach (enrollment growth)
4) Invest in our future (fund development and campus improvement)
5) Foster stewardship (institutional health)

The above mission and goals encompass the values that are the heart of the university. Some of the ways that the Applied Science and Sustainability program supports the above mission, goals, and values of the university follow:

Students in the biology, chemistry, and physical science lab gain proficiency in contemporary methods and analytical equipment, with a strong emphasis on scientific inquiry. Constructivist teaching approaches are modelled, along with cooperative learning groups.

The Department of Natural and Applied Sciences sponsors several department chapels each semester. While led by department faculty, there is often significant student involvement. In addition, each faculty person integrates theology and their discipline wherever it is appropriate. Applied Science and Sustainability majors have participated in these activities, along with specific course assignments related to challenging topics like bioethics and origins.

This program is based on strong interpersonal interactions. Enrolment growth is assisted by the personal testimonials of our graduates, and prospective students meeting with current majors.

This program has not been significantly involved in fund development or campus improvement, other than producing loyal alumni who support the institution after graduation.

Institutional health is fostered by the production of biology teachers who holistically integrate the disciplines and practices of biology and Christian faith.

6. Collaboration with other EU Programs: NA

7. Changes since the last APR: No changes, this is the first APR.

8. Adverse effect of elimination of the program: While enrolments are small in this program, graduates are very influential in the lives of their students. Most of the courses are offered for other majors in education and biology, so there is only a slight educational cost for this major. If eliminated, EU would no longer produce graduates in this field.

SECTION 3: Relevance

9. Enrollment trends and demand:

Enrolments in this major are increasing.The approximate number of majors each fall for the previous four years is as follows.

- 2019: 14 (6% of the dept. total)
- 2018: 14 (6% of the dept. total)
- 2017: 10 (4% of the dept. total)
- 2016: 10 (4% of the dept. total)

According to the U.S. Bureau of Labor Statistics (2020), employment opportunities for environmental biologists continues rise.

10. How the program has evolved in response to changing demands/needs: The major started out about 12 years ago as environmental science, Four years ago the name was changed to Applied Science and Sustainability. Two years ago the Compassion track was added.

11. SWOT (Strengths, Weaknesses, Opportunities, Threats) Analysis: A SWOT analysis was done following the 2019/2020 academic year.

2020 Applied Science and Sustainability Curriculum Advisory Committee
May, 2020

Two Applied Science and Sustainability graduates and one non-EU graduate provided feedback for this SWOT analysis.

Katherine Crank (EU 2017 graduate)
Double major, Environmental Science and Chemistry
PhD Candidate in Chemistry at Notre Dame

Chris Groh (EU 2016 graduate)
Environmental Science
Completed MS Plant Science at Missouri State University
Employee of Convoy of Hope International as an Agrigcultural Specialist

Craig Young (MS)
Young currently serves with the National Park Service as a Biologist and Invasive Plant Program Leader for the Heartland Inventory and Monitoring Network. In this role he oversees the Heartland Exotic Plant Management Team, which is dedicated to managing invasive plants across all network parks. The network stretches from Ohio west to Kansas, and from Minnesota south to Arkansas. The size of network parks ranges from 160 acres, to almost 100,000 acres.

Q1 - What are the main strengths of the Evangel University Applied Science and Sustainability program?

The academic rigor of the program is unlike any other environmental science type program in the country.
The variety of electives, such as Applied Pathology and Applied Sustainability.

Professors are top notch individuals' fantastic lecturers, caring humans, good test writers.

Q2 - What are the main weaknesses of the Evangel University Applied Science and Sustainability program?

Upper division classes should be pushed to research and write.
Lack of a formal internship program.
Lack of research opportunities

Q3 - What are the main opportunities for the Evangel University Applied Science and Sustainability program?

Inter-college interactions to do research.
Research hours being mandatory for graduates.
Inter-agency partnerships to conduct research and peer learning.

Q4 - What are the main threats to of the Evangel University Applied Science and Sustainability program?

The rigors of the program are a Biology degree so those hiring might question why we didn't just add a sustainability concentration to our Biology degree.
The cost for a science degree is higher than a public institution from a faculty that is not as published and well known making scientific credibility.
Lack of ongoing funding for student research.
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12. Opportunities & Threats:

Opportunities

Job prospects are good, but require a lot of internship and employment experience.

Threats

While enrolment in this major is in an upward trend, it is still difficult to recruit students into this major, probably due higher paying jobs in biomed and healthcare.

The financial state on Evangel University could be a threat to the program. At present, there are 14 Applied Science and Sustainability majors. Administrative leaders have said that programs with under 20 majors could be targeted for elimination.

13. How strengths/opportunities can be used to overcome weaknesses/threats:

Based on the SWOT analysis, tables specifying recommendations and action items determined to date are attached.

Finding	Recommendation	Resources Needed
Need for Internships	Create a systematic internship portal for student use.	None.

Lack of research opportunities	Require a capstone research project in Senior Seminar	None.
Action	**Responsible Person**	**Timeline**
Make internships a degree requirement	Michael Tenneson	Completed in 2019.
Add a required research component.	Michael Tenneson, Jason Streubel	Fall 2020

SECTION 4: Effectiveness

14. Most recent PLO assessment data/results: A Student learning Assessment Report (SLAR) was generated following the 2019/2020 academic year. That data and results follow:

Department: Natural and Applied Sciences Program Coordinator: Michael Tenneson
Academic Program Evaluated: Applied Science and Sustainability Program Review Year: 2019-2020

	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.)	1. Erica Harris, Assistant Professor of Biology Artifact Assessor 2. Joshua Kendall, Assistant Professor of Environmenta Science Artifact Assessor 3. Jason Streubel, Associate Professor of Environmenta Science Artifact Assessor 4. Michael Tenneson, Profes of Biology Artifact Assessor	1. Erica Harris, Assistant Professor of Biology Artifact Assessor 2. Jonathan LeCureux, Assist Professor of Biology Artifa Assessor 3. Jason Streubel, Associate Professor of Environmenta Science Artifact Assessor	1. Erica Harris, Assistant Professor of Biology Artifact Assessor 2. Jonathan LeCureux, Assist Professor of Biology Artifa Assessor 3. Jason Streubel, Associate Professor of Environmenta Science Artifact Assessor 4. Michael Tenneson, Profes of Biology Artifact Assessor	
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:3 Juniors:0 Seniors:3 Graduate:0	Freshmen: 2 Sophomores:0 Juniors: 3 Seniors:5 Graduate:	Freshmen: 3 Sophomores:4 Juniors:2 Seniors:5 Graduate:	Freshmen: Sophomores: Juniors: Seniors: Graduate:
Instrument(s) used in assessment: (List the exams,	1. Ecosystem Observation Project – BIOL 342 Ecology		1. Ecosystem Observation Project – BIOL 342 Ecology	

standardized tests, portfolios, etc. that were used in the assessment process.)	2. Critical thinking assignmer (Animal Behavior) in BIOL 202 Botany Critical thinkin 3. Critical thinking assignmer (Ethics of Extinction) in BI(343 Environmental Biolog 4. Laboratory Final in BIOL 2(Botany 5. Laboratory worksheets in CHEM 111 General Chemistry * 6. Laboratory worksheets in BIOL 202 Botany 7. SWOT Analysis of Mt. Susv Kenya in BIOL 343 Environmental Biology 8. Traffic Analysis Springfield MO in BIOL 343 Environmental Biology		2. Critical thinking assignmer (Animal Behavior) in BIOL 202 Botany Critical thinkin 3. Critical thinking assignmer (Ethics of Extinction) in BI(343 Environmental Biolog 4. Laboratory Final in BIOL 2(Botany 5. Laboratory worksheets in CHEM 111 General Chemistry * 6. Laboratory worksheets in BIOL 202 Botany 7. SWOT Analysis of Mt. Susv Kenya in BIOL 343 Environmental Biology 8. Traffic Analysis Springfield MO in BIOL 343 Environmental Biology	
Additional Data: (List any additional information/data that informed this report.)				
Methodology: (Explain the method of data collection and the data analysis process.)	Using 4 point scale rubrics, assesso scored student work on instrument above in Course Commons.		Using 4 point scale rubrics, assesso scored student work on instrument above in Course Commons.	
Results of Assessment: (List the findings in summary format as narrative.)	For all four areas assessed, student average scores are well above proficient (score of 3+). Students a doing particularly well in demonstrating the use technology associated with the study of environmental science.		For all four areas assessed, student average scores are well above proficient (score of 3+). Students are doing particularly well in demonstrating the use technology associated with the study of environmental science	

Data: **(Provide the graphs, charts, etc. that were used to show data results. Do not include the actual data.)**	**Results of Assessment (mean scor on a scale of 1-4; 3+ considered proficient)** The student will be able to apply the scientific method to research problems in the environmental science field: **mean=3.15** Use classroom theory to field understanding and application by participation in off campus class opportunities: **mean =3.75** Demonstrate the use technology associated with the study of environmental science: **mean = 3.76** Communicate a scientifically informed world view through writing: **mean= 3.55**		**Results of Assessment (mean scor on a scale of 1-4; 3+ considered proficient)** The student will be able to apply the scientific method to research problems in the environmental science field **Mean =3.57 (n=14)** Use classroom theory to field understanding and application by participation in off campus class opportunities **Mean = 3.17 (n=47)** Use technology associated with the study of environmental science **Mean = 3.15 (n=14)** Communicate a scientifically informed world view through writing. **Mean = 3.15 (n=48)**	
Strengths: **(From the findings, list the areas of strengths that currently exist in the academic program.)**	For all four areas assessed, student average scores are well above proficient (score of 3+). Students a doing particularly well in demonstrating the use technology associated with the study of environmental science.		1) For all four areas assessed, student average scores are well above proficient (score of 3+). Students are doing particularly well in demonstrating the use technology associated with the study of	

			environmental science. 2) Students are continuing to grasps the interconnectedness of the study of environment and the rest sciences. 3) Students are leaving EU undergraduate education and going onto MS and PhD programs successfully succeed at that level.	
Areas in need of improvement: **(From the findings, list the areas of weakness(s) that currently exist in the academic program.)**	Students showed the lowest levels proficiency in applying the scientifi method to research problems in environmental science.		1) Students showed the lowest levels of proficiency in "Use classroom theory to field understanding and application by participation in off campus class opportunities," "Use technology associated with the study of environmental science," and "Communicate a scientifically informed world view through writing." 2) We have good success wit students going into gradua programs but there needs be a greater uptick of students successfully goin	

			directly into the applied science workforce.	

15. Source of Professional Standards: na.

16. Post-graduation placement of your graduates: All Applied Science and Sustainability graduates have been placed jobs related to their field.

17. Additional evidence of the program's quality and success: Anecdotal comments from employers, SWOT analysis.

18. The Applied Science and Sustainability program does not have an A.A. Degree.

SECTION 5: Sustainability

19. Revenue Opportunities: There are no revenue opportunities to report at this time.

20. Resources: Currently, the Applied Science and Sustainability program has the personnel and technological resources to meet its needs.

21. Efficiencies beneficial to Evangel University: Good PR to the education community that our graduates make a large impact on the environment and helping the needy.

SECTION 6: Planning for the Future

22. Strategic Objectives: The EU strategic goal that the Applied Science and Sustainability program has the most potential to positively affect is that of expanding our reach (enrollment growth). Enrollment growth can also be positively affected by promoting this program through EU promotional campaigns.

ACADEMIC PROGRAM REVIEW (APR)

Biology Education

(Part A)

"Are we teaching the right things?"

SECTION 1: Introduction

1. **Department:** Natural & Applied Science
Academic Program: Biology Education
Program Coordinator: Michael Tenneson
Academic Year of Review: 2019-2020

2. Program Description: The Biology Education program represents a partnership between the Natural and Applied Sciences Department and the Education Department to provide a comprehensive major to prepare biology students for a career in secondary education. All biology education majors must complete a total of 37 credit hours of secondary education courses as listed under Department of Education, Secondary Education. Biology education majors must complete: a) the Science Core Requirements and b) the subject certification track.

3. The following faculty teach one or more courses in the discipline:
Mrs. Erica Harris (BS Biology, MS Biology)
Dr. Jonathan LeCureux (BS Biology, PhD Microbiology)
Mrs. Julie Mayne (BS Biology, MS Biology, EdD Candidate)
Dr. Michael Tenneson (BA Biology, MS Biology, MA Missiology, PhD Science Education)

4. Stakeholders: The primary stakeholders are the students participating in the program. Other stakeholders are the schools that will hire our graduates. Finally the students taught by our graduates are also stakeholders.

SECTION 2: Identity: Mission, Values and Strategic Plan

5. Advancing the Mission: Evangel University's mission statement is as follows:

"Evangel University is a comprehensive Christian university committed to excellence in educating and equipping students to become Spirit-empowered servants of God who impact the Church and society globally."

Evangel has identified the following goals:

1) Lead academic innovation (academic excellence)
2) Nurture spiritual vitality (spiritual vitality)
3) Expand our reach (enrollment growth)
4) Invest in our future (fund development and campus improvement)
5) Foster stewardship (institutional health)

The above mission and goals encompass the values that are the heart of the university.
Some of the ways that the Biology Education program supports the above mission, goals, and values of the university follow:

Students in the biology, chemistry, and physical science lab gain proficiency in contemporary methods and analytical equipment, with a strong emphasis on scientific inquiry. Constructivist teaching approaches are modelled, along with cooperative learning groups.

The Department of Natural and Applied Sciences sponsors several department chapels each semester. While led by department faculty, there is often significant student involvement. In addition, each faculty person integrates theology and their discipline wherever it is appropriate. Biology education majors have participated in these activities, along with specific course assignments related to challenging topics like bioethics and origins.

This program is based on strong interpersonal interactions. Enrolment growth is assisted by the personal testimonials of our graduates, and prospective students meeting with current majors.

This program has not been significantly involved in fund development or campus improvement, other than producing loyal alumni who support the institution after graduation.

Institutional health is fostered by the production of biology teachers who holistically integrate the disciplines and practices of biology and Christian faith.

6. Collaboration with other EU Programs: The Biology Education major encompasses required courses in the Education Department and the Natural and Applied Sciences Department, along with Common Core requirements. Biology education students have an advisor in the Education Department and the Natural and Applied Sciences Department to keep them on track with their academic programs.

7. Changes since the last APR: No changes, this is the first APR.

8. Adverse effect of elimination of the program: While enrolments are small in this program, graduates are very influential in the lives of their students. Most of the courses are offered for other majors in education and biology, so there is only a slight educational cost for this major. If eliminated, EU would no longer produce HS biology teachers.

SECTION 3: Relevance

9. Enrollment trends and demand:

Enrolments in this major are increasing.The approximate number of majors each fall for the previous four years is as follows.

- 2019: 7 (3% of the dept. total)
- 2018: 4 (2% of the dept. total)
- 2017: 5 (2% of the dept. total)
- 2016: 3 (1% of the dept. total)

According to the U.S. Bureau of Labor Statistics (2020), employment opportunities for biology teachers continues rise.

10. How the program has evolved in response to changing demands/needs: The program requirements are linked to the Missouri Department of Elementary and Secondary Education requirements. As they change, so does our program.

11. SWOT (Strengths, Weaknesses, Opportunities, Threats) Analysis: A SWOT analysis was done following the 2019/2020 academic year.

2020 Biology Education Curriculum Advisory Committee
June 1st 2020, 4:44 pm CDT

Two Biology Education graduates provided feedback for this SWOT analysis.

Antonio De La Torre (2016) and Mikala Salazar (2019).

Antonio worked at Orion academy as a life science teacher 2019- present. Previously he was employed at West Plains HS where he taught biology, earth science, medical detective (2017-2019.

Mikala will start Fall, 2020 at Joplin High School where she will teach physical science and chemistry.

Q1 - What are the main strengths of the Evangel University Biology Education program?

Prepares you to be the best biology teacher you can be.
Professors are content professionals and support you through the content.
They challenge the student in all areas.
Evangel does a good job of preparing the student to actually be in the classroom.
Many teachers struggle with different part of getting accustom to the school or the curriculum.
Evangel biology education program does a great job of being able to align the content to curriculum and the students.
This program has many strengths.
Perhaps the biggest strength is the professors.
The professors in this program truly care about the students and are willing to go above and beyond to make the learning experience exceptional and personal.
The content provided during instruction is also relevant and applicable to future teaching careers.

Q2 - What are the main weaknesses of the Evangel University Biology Education program?

I believe one of the main weaknesses is helping the student prep for the state test.
Did a great job after, but not during.
The biggest weakness of the program is probably the communication breakdown that sometimes occurs between the education department and the students.
The education field changes constantly and it can be hard for the students to keep up with those changes.
Also, there is sometimes a lack of organization within the department.

Q3 - What are the main opportunities for the Evangel University Biology Education program?

The program is rigors, so it preps students for being in the classroom.
Professor can work one on one with students in areas that they may be struggling.
The students are able to get one on one expertise on curriculum and content.
Students are prepared to handle any situation that comes there way because of the guidance of the professors.
The biology education program provides its students with a lot of connections with future careers.

Q4 - What are the main threats to of the Evangel University Biology Education program?

One of the main threats to evangel university biology education program is the state test.
Another would be the recruitment.
Evangel has an excellent program, but should promote the biology education program more.
The main threat of the program is continuing to provide updated and relevant information about DESE because changes are made so consistently.

12. Opportunities & Threats:

Opportunities

Job opportunities abound for biology teachers in this area. All of our graduates have landed jobs soon after graduating.

Threats

While enrolment in this major is in an upward trend, it is still difficult to recruit students into this major, probably due higher paying jobs in biomed and healthcare.

The financial state on Evangel University could be a threat to the program. At present, there are 7 biology education majors. Administrative leaders have said that programs with under 20 majors could be targeted for elimination.

13. How strengths/opportunities can be used to overcome weaknesses/threats:

Based on the SWOT analysis, tables specifying recommendations and action items determined to date are attached.

Finding	Recommendation	Resources Needed

Students need better prep for the Biology Content Exams mandated by the State.	Incorporate exam prep in the curriculum.	Staffing, materials.
Communication problems in the Education Dept.	Establish regular communication channels to include science faculty, education faculty, and students.	None.
Action	**Responsible Person**	**Timeline**
Develop exam prep materials	Julie Mayne	2020-2021 academic year.
Ask Education Dept. admin assistant to include science faculty in correspondences with science ed major students.	Michael Tenneson	Fall 2020

SECTION 4: Effectiveness

14. Most recent PLO assessment data/results: A Student learning Assessment Report (SLAR) was generated following the 2019/2020 academic year. That data and results follow:

Department: Natural and Applied Sciences Program Coordinator: Michael Tenneson
Academic Program Evaluated: Biology Education Program Review Year: 2019-2020

	Year 1 **Academic Year:** 2019-2020	Year 2 **Academic Year:**	Year 3 **Academic Year:**	Year 4 **Academic Year:**
Faculty members involved in this assessment process: (List all faculty members who participated: program coordinator, reviewers, committee members, etc.)	1. Erica Harris, Assistant Professor of Biology Artifact Assessor 2. Jonathan LeCureux, Assistant Professor of Biology Artifact Assessor 3. Jason Streubel, Associate Professor of Environmental Science Artifact Assessor Michael Tenneson, Professor o Biology Artifact Assessor		1.	4.

Number of students in sample: (If known, supply the number of students in each class/year who were used in the assessment report.)	Freshmen: Sophomores: Juniors: Seniors: Graduate: N=6	Freshmen: Sophomores: Juniors: Seniors: Graduate:	Freshmen: Sophomores: Juniors: Seniors: Graduate:	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 above in Course Commons. 9. Taxonomy items on unit test in BIOL 201 Zoology 10. Plant collection in BIOL 202 Botany 11. Group investigation oral presentation in BIOL 200 Gene Biology 12. Oral presentation in BIOL 335 Microbiology 13. Oral presentation in BIOL 496 Senior Seminar 14. Group investigation lab report i BIOL 200 General Biology 15. Labs in BIOL 202 Botany 16. Microorganism paper in BIOL 3 Microbiology 17. Literature review paper in BIOL 496 Senior Seminar 18. Unknown microorganism lab exam in BIOL 335 Microbiology 19. Fruit fly gene propagation lab i BIOL 338 Genetics 20. Food systems project in BIOL 2 Botany 21. Primer design exercise in BIOL 335 Microbiology			

Additional Data: (List any additional information/data that informed this report.)				
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**			
Data: **(Provide the graphs, charts, etc. that were used to show** PLO **data results. Do not include the raw data.)**	Develop understanding of function/structure/classification of life Mean= 3.07 (n=6) Effectively communicate principles of biology through oral means Mean= 3.66 (n=6) Effectively communicate principles of biology through written means Mean= 3.51 (n=6) Demonstrate proficiency in laboratory technique Mean= 3.68 (n=6) Demonstrate ability to know, analyze, and synthesize scientific principles Mean= 3.42 (n= 6)			
Results of Assessment: (What evidence exists that the program helps students achieve learning outcomes? What changes have been made since the last APR to ensure that outcomes are achieved and what changes will be made to the program following this APR? What have you learned from assessing the changes?)	Student averages are above the proficient score of 3 in all five assessed competencies.			

Strengths: **(From the findings, list the areas of strengths that currently exist in the academic program.)**	Students have competency in developing understanding of function/structure/ classification of life and in demonstrating their ability to know, analyze, and synthesize scientific principles in the last two years.			
Areas in need of improvement: **(From the findings, list the areas of weakness(s) that currently exist in the academic program.)**	Develop understanding of function/structure/classification of life mean scores are the lowest and should be targeted for improvement.			
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.	~~Increase of focus on oral presentations and assignments~~ ~~-Summer and Fall 2019~~ ~~-LeCureux and Mayne~~			
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.			1.	

15. Source of Professional Standards: The Biology Education program has been guided by the Missouri Department of Elementary and Secondary Education.

16. Post-graduation placement of your graduates: All biology education graduates have been placed in teaching jobs the year they graduated.

17. Additional evidence of the program's quality and success: Anecdotal comments from principles about the quality of our graduates.

18. The Biology Education program does not have an A.A. Degree.

SECTION 5: Sustainability

19. Revenue Opportunities: There are no revenue opportunities to report at this time.

20. Resources: Currently, the Biology Education program has the personnel and technological resources to meet its needs.

21. Efficiencies beneficial to Evangel University: Good PR to the education community that our graduates make great teachers.

SECTION 6: Planning for the Future

22. Strategic Objectives: The EU strategic goal that the biology education program has the most potential to positively affect is that of expanding our reach (enrollment growth). Enrollment growth can also be positively affected by promoting this program through EU promotional campaigns.

EVANGEL UNIVERSITY
YOUR CALLING. OUR PASSION.

ACADEMIC PROGRAM REVIEW (APR)
Computer Science (CPSC)
(Part A)
"Are we teaching the right things?"

SECTION 1: Introduction

1. **Department:** Natural & Applied Science
   Academic Program: Computer Science (CPSC)
   Program Coordinator: Mr. Douglas Mitcham
   Academic Year of Review: 2019-2020

2. **Program Description:** A general program that focuses on computers, computing problems and solutions, and the design of computer systems and user interfaces from a scientific perspective. Includes instruction in the principles of computational science, and computing theory; computer hardware design; computer development and programming; and applications to a variety of end-use situations. In addition to the general program, the student can choose a track providing special emphasis in cybersecurity or data science.

3. **The following faculty teach one or more courses in the discipline:**
   - Mr. Doug Mitcham (BS Mathematics, MS Computer Science, 13 years of industry experience)

   - Dr. Don Tosh (BS Mathematics, MS Mathematics. PhD Mathematical Statistics)

   - Dr. Jeremy Harris (Bachelor of Music Education (BME), Masters in Music – Vocal Performance (MM), MBA with an emphasis in Computer Information Systems, Educational Specialist degree (EdS), PhD in Educational Technology)

   - Dr. William Cook (BA Mathematics, MA Mathematics, MS Electrical and Computer Engineering, MS Chemistry, PhD Chemistry, many years of industry experience at Sandia National Laboratories leading R&D projects and serving in senior management positions in the CIO office, Defense Programs, Remote Sensing and Verification, International Security, and Information Operations)

4. **Stakeholders:** The primary stakeholders are the students participating in the program. The program must ensure that the CPSC graduates are adequately prepared to enter graduate school and/or immediate employment.

Another stakeholder is the University and Department of Natural & Applied Science. The number of CPSC students and their success have a definite effect on both the school and the department financially, academically, and how they are viewed by companies and those individuals external to the university.

Other stakeholders encompass the companies that hire or utilize our CPSC graduates. This ranges from the many companies that hire our graduates for full-time employment as well as the organizations that utilize the abilities of our CPSC majors for internships, church IT support, etc. They depend on the student having the appropriate knowledge and skills to be successful in their area of employment/support.

SECTION 2: Identity: Mission, Values and Strategic Plan

5. Advancing the Mission: Evangel University's mission statement is as follows:

"Evangel University is a comprehensive Christian university committed to excellence in educating and equipping students to become Spirit-empowered servants of God who impact the Church and society globally."

Evangel has identified the following goals:

1) Lead academic innovation (academic excellence)
2) Nurture spiritual vitality (spiritual vitality)
3) Expand our reach (enrollment growth)
4) Invest in our future (fund development and campus improvement)
5) Foster stewardship (institutional health)

The above mission and goals encompass the values that are the heart of the university. Some of the ways that the CPSC program supports the above mission, goals, and values of the university follow:

- Computer science cybersecurity and data science tracks are available, taking advantage of the growing demand for computer science graduates equipped with related knowledge and skills in those areas. Elective classes also provide coverage consistent with areas of growing interest (Artificial Intelligence, Gaming, Data-Driven Web Design, Mobile Apps, etc.). These offerings support both academic innovation (improving student experience and success) as well as expanding our reach to increase enrollment.

- The program incorporates hands-on, practical exercises, including on-line interactive texts, online security exercises, actual database development and advanced SQL (Structured Query language) exercises. The student experience enhanced further enhanced by internship opportunities. This supports academic innovation, improving student experience and success.

- The program provides a collaboration room equipped with wall-mounted monitor, table, chairs, and coffee machine for student collaboration and teamwork. This also supports academic innovation.

- The program supports (and helps assess) the Technical Ingenuity/Proficiency EU 20 outcome.

6. **Collaboration with other EU Programs**: The MATH 212 (Discrete math) and/or CPSC 111 (Introduction to Computer Science) courses are part of the CPSC program. At least one of these two courses are also included in the Pre-Engineering, Applied Math, and Math Education programs. Multiple courses in the CPSC program are also required in the Computer Information Systems (CIS) program, which has moved to the Business Department.

   Evangel's IT Department has benefitted from students in the CPSC program. Several have interned in the IT Department and some have remained after graduation to work in that department full-time.

7. **Changes since the last APR:** Since the last CPSC APR in 2016, the following changes have been implemented:
   - Data Science and Cybersecurity tracks have been developed and will be available for students to choose starting with the fall 2020 semester. The general computer science track/program is still available.
   - An internship requirement has been added to the CPSC program (and is also part of the two new tracks mentioned above).
   - New electives have been offered including Introduction to Cybersecurity, Mobile Apps, Data-Drive Web Design, Game BOTS. Others will continue to be added to support the new tracks as well as technological interest and growth.
   - Java has become the primary second higher-order language, replacing an outdated Visual Basic. Java is prevalent in industry and provides a visual component as well.
   - On-line, interactive textbooks (zyBooks) have been used in some courses, saving the student money as well as offering a convenient and effective learning tool.
   - In response to prior assessments, more examples and hands-on exercises have been incorporated into the courses. One primary example is the Database Management Systems class (CPSC 441), where students build a database and perform various Structured Query Language (SQL) commands ranging from simple to complex. Feedback from graduates have confirmed the value of that training.

8. **Adverse effect of elimination of the program:** Typically, the CPSC program accounts for 9% to 12% of the majors in the Department of Natural & Applied Sciences. Often, this is the third highest number of majors in the department (biology always claiming the most majors). The demand for computer science graduates deems the CPSC program one for great potential growth. Eliminating the program would decrease enrollment in the department and University. It would also eliminate a significant target of prospective interest for High School seniors and transfer students looking at potential schools. Computer Science is extremely relevant, rewarding, and in high demand. There is soaring interest in areas like cybersecurity and data science. With the addition of those tracks in the CPSC program (and with proper marketing), Evangel is hoping to take advantage of that demand. Eliminating the program would be unwarranted based on demand and potential, especially for an institution attempting to increase enrollment. Elimination would also diminish Evangel's ability to prepare students for an ever-increasing technological world.

SECTION 3: Relevance

9. **Enrollment trends and demand:** The approximate number of majors each fall for the previous 10 years is as follows.
   - 2019: 19 (8% of the dept. total)
   - 2018: 25 (11% of the dept. total)
   - 2017: 24 (10% of the dept. total)
   - 2016: 23 (9% of the dept. total)
   - 2015: 36 (includes CIS majors)
   - 2014: 30 (includes CIS majors)
   - 2013: 25 (includes CIS majors)
   - 2012: 29 (includes CIS majors)
   - 2011: 29 (includes CIS majors)
   - 2010: 32 (includes CIS majors)
   - 2009: 22 (includes CIS majors)

   As indicated, earlier higher totals include some, if not all, of the CIS majors. The number of CPSC majors has remained relatively flat. As was the case for the fall of 2019, at times a large group of CPSC majors graduate and the number of new majors in the subsequent fall is not enough to replace those graduates, leading to a smaller number of majors. The COVID-19 pandemic may have a temporary effect on the totals but overall, with current demand and the addition of the Cybersecurity and Data Science tracks, enrollment should increase.

   According to the U.S. Bureau of Labor Statistics (2020), employment of computer and information technology occupations is projected to grow 12 percent from 2018 to 2028, much faster than the average for all occupations. These occupations are projected to add about 546,200 new jobs. Demand for these workers will stem from greater emphasis on cloud computing, the collection and storage of **big data**, and **information security**. The median annual wage for computer and information technology occupations was $88,240 in May 2019, which was higher than the median annual wage for all occupations of $39,810. This data reflects the external demand for CPSC graduates and also shows that the new CPSC tracks being implemented target the most prominent areas of growing demand.

   Evangel is unique in that we are the only AG affiliated university to offer programs in both Computer Science and Computer Information Systems.

10. **How the program has evolved in response to changing demands/needs:** As mentioned previously, to take advantage of current technological trends and demand, tracks have been added for data science and cybersecurity. With proper marketing and the availability of these tracks starting with the fall 2020 semester, an increase in enrollment is expected.

    The marketability of our graduates has increased with internships done. Evangel students have universally done extremely well when interning, often leading to full-time post-graduate employment. The success of these internships have also had a positive effect on how local industry views Evangel's CPSC program and graduates. The internship has been made a program requirement as a result of these benefits it provides.

    The additional elective courses offered since the last APR reflect the areas of technological demand and interest.

11. **SWOT (Strengths, Weaknesses, Opportunities, Threats) Analysis:** A SWOT analysis was done following the 2019/2020 academic year. That analysis follows:

A Computer Science (CPSC) Curriculum Advisory Committee of recent graduates of the program was formed to provide program feedback for the purposes of this report and program analyses. Three graduates comprise the committee and include a new graduate entering his first full-time job in the industry, a graduate doing post-graduate studies for an advanced degree, and a former graduate who has worked for multiple companies and in multiple environments in the industry (after doing post-graduate studies). These graduates are the following individuals:

- Isaiah Sashidharan
  A 2020 CPSC and Computer Information Systems (CIS) graduate who is graduating summa cum laude with a 3.902 gpa. He is being awarded the 2020 Outstanding Computer Science Graduate award as well as the 2020 Outstanding Computer Information Systems Graduate award. During his senior year, he earned a competitive internship for the O'Reilly Auto Parts Company in Springfield, MO. He was offered, and will transition to, full-time employment upon graduation working on the Corporate Systems Team as a Software Developer. His duties include providing insight to Project Analysts and coding and maintaining those projects.

- Vincent Bushong
  A 2019 CPSC and Computer Information Systems (CIS) graduate who graduated summa cum laude with a 4.000 gpa. He was awarded the 2019 Outstanding Computer Science Graduate award. He is currently pursuing an advanced degree at Baylor University (to be completed in December 2020).

- Bradley Brown
  A 2018 CPSC and Computer Information Systems (CIS) graduate who graduated summa cum laude with a 3.968 gpa. He was awarded the 2018 Outstanding Computer Science Graduate award. After graduation, he earned his MS degree from the University of Louisville in Business Analytics. From August 2018 to August 2019, Brad worked for the American Queen Steamboat Company doing data analytics and creating analytical dashboards for senior executives. In August 2019, Brad began work for Humana Pharmacy Solutions with the title of Informaticist I. His duties include writing and maintaining SAS (Statistical Analysis System) code as well as developing, deploying, and analyzing statistical study designs.

Based on feedback from these individuals and also from internal reviews and feedback, the following strengths, weaknesses, opportunities, and threats can be reported at this time:

Strengths

All Advisory Committee members were complimentary of the CPSC program and said that it adequately prepared them for graduate school and/or immediate employment. The dedication and helpfulness of the faculty remain a strength. Although the number of faculty involved in the program is limited, the relationships fostered continue to be a highlight mentioned by the graduates. Some feedback has been that they model the employee/supervisor relationships they develop when entering the work force.

Over the years, the Database Management class has been cited many times by our graduates as being most helpful. The course, and hands-on SQL (Structured Query Language) exercises that have been added to that course, were again mentioned as a strength by the current Advisory Committee members. That SQL training translated directly to job (and even grad school) tasks.

As with the last SWOT Analysis, the structure of the senior project was cited by one committee member as being a strength as it modeled the steps of projects that he works on in his job.

Another strength of the program mentioned by all of the Advisory Committee members was the programming done in the CPSC program. That training, with the various programming constructs and concepts taught, has allowed graduates to adapt to new languages, regardless of the platform used.

Two of the committee members mentioned were officers of Evangel's first ACM (Association of Computing Machinery) student chapter. Having this student chapter was mentioned as a strength, fostering team collaboration as well as leadership and management skills. Unfortunately, Evangel's student chapter has been suspended for the time being due to the faculty

sponsor (Dr. Jeremy Harris) moving to the Business Department and a lack of interest from students. As the program grows, reactivation of this student chapter will be examined.

It should be mentioned that the following recommendations from the previous SWOT have been incorporated:

1. Add more electives, possibly leading to 'tracks' within the program. Electives such as Intro to Cybersecurity, Game BOTS, Data-Driven Web Design, Mobile Apps have been taught. Also, Data Science and Cybersecurity tracks have been generated and approved.

2. Do hands-on SQL training in the Database management class. As mentioned previously, that hands-on training has been added to a revamped Database Management course.

3. Migrate from Visual Basic to a more relevant second higher-order language (HOL) class. We have moved from Visual Basic to Java as the second HOL. Java is used by many companies and institutions of higher learning.

4. Introduce activities/events that would foster involvement by the CPSC majors. Until recently, the ACM student chapter accomplished this goal. Also, department activities have been increased and targeted to all students within the department.

5. Involvement of local professionals was recommended. An internship requirement has been added to the program and will accomplish this recommended action.

The only prior SWOT recommendation that was not incorporated was the adding of coding exercises to the Operating Systems course. That course will be taught in the FA20 semester using a new, updated version of the text that has coding exercises. This presents the opportunity to carry out this recommendation.

Weaknesses

Although the current and previous Advisory Committee members and CPSC graduates in general said they were adequately prepared for graduate school and/or immediate employment, a few of those going on to graduate studies said that they could have benefitted from more math. Fortunately, this need is something that is addressed (but has not been strongly enforced). The CPSC portion of the catalog states that those planning to do post-graduate studies are advised to take Calculus I and II as well as Linear Algebra. These are not program requirements. Stricter academic advising is needed for those students to adhere to this recommendation. The only required math is Discrete Math and a math course meeting the general education requirement (most often Elementary Statistics).

The Advisory Committee mentioned the need for data analytics/science courses. This will be accomplished by the newly-added Data Science CPSC track.

The need for more (and relevant) topics/electives was mentioned. Part of this involves moving the Assembler class exercises to a more relevant platform. Although staffing is limited, more electives have been offered and there will be even more with addition of the Cybersecurity and Data Science tracks. The Assembler class is offered in the spring of odd years. Either in the SP21 semester or the SP23 semester, the platform will be changed with the change in the faculty member that teaches the course (due to retirement).

Algorithm development is the most important skill in computer science and often the hardest to develop. Skills are gained gradually over the course of the program and continue on with experience. One committee member recommends more devotion to this topic/skill. He said that even fellow employees that took a whole class in logic struggled equally with him in some of the more complex algorithms.

Currently, there is only one team project in the program. It was mentioned that another (or more) team project(s) should be implemented, perhaps in the Systems Analysis and Design class. It was recommended that it follow the Agile Software Development model and that something like GitHub or Microsoft Teams be used for team collaboration. This would mimic team projects

done in the work environment.

12. Opportunities & Threats:

Opportunities

Opportunities external to Evangel continue to exist that could be exploited to enhance the CPSC program. One of them is the increase in computer-related jobs available in the Springfield area. Relationships with several of these companies have been developed by on-campus visits and presentations, personal contact, and graduates employed by them. The internship requirement has been added to the program to take advantage of this opportunity. Another benefit is that the internship almost always has led to an offer of immediate full-time employment upon graduation.

Another opportunity that could be exploited is the availability of on-line and cloud-based platforms. We have already taken advantage of on-line interactive texts (zyBook) in some of the classes. For the classes in which coding is done, these have built-in compilers so that coding can be done within the text itself (although the Visual Studio platform is also used). Other cloud-based platforms could be exploited such as the resources of Cybrary, EC-Council/Academia, etc. EC-Council/Academia offers course materials, virtual lab exercises, etc. for courses in Computer Forensics and Ethical Hacking (among others). Those are two of the new courses that are part of the CPSC Cybersecurity track so are worth investigating. Cost could be a factor.

In the previous SWOT analysis, teaching the Agile development methodology was suggested since many software development teams are using Agile/Scrum now and look for people with experience/familiarity with it. The use of GitHub was mentioned by the current and prior Advisory Committees. GitHub is a collaborative site for developers and could be very beneficial for team projects, etc.

The ever-increasing interest in cybersecurity and data analytics provides another opportunity. To take advantage of the growing popularity of these areas, the Cybersecurity and Data Science tracks have been added and approved.

Threats

The primary external threat to the program continues to be the cost of private universities versus public state universities. Public institutions like Evangel are much more expensive than the state universities. When we fail to retain a computer science major, most often the reason is lack of finances. It may be that the cost could be a deterrent to students attending Evangel at all. The COVID-19 crisis has further enhanced that threat.

The financial state on Evangel University could be a threat to the program. At present, there are 17 CPSC majors due to attend in the FA20 semester (more could be added before the start of the semester). Administration has said that programs with under 20 majors could be targeted for elimination. From the number of CPSC majors each fall (given previously in this report) the average number of majors is approximately 26 per year. Some years have had a large graduating class. This leaves a smaller number of majors if the incoming class is not large enough to replace those that graduated. It is felt that the program numbers will increase with incorporation of some of the program enhancements previously mentioned.

An additional threat may be the staffing as Professors elect to retire. Qualified replacements (adjunct or full-time) would have to be found and hired for needs that extend beyond the remaining department faculty.

13. How strengths/opportunities can be used to overcome weaknesses/threats:

Based on the SWOT analysis, tables specifying recommendations and action items determined to date are attached.

Finding	Recommendation	Resources Needed
Students that are going to graduate school need more math.	During academic advising, determine as early as possible those students planning to attend graduate school and more strictly advise them into the recommended MATH 231, 232, and 331 courses	No additional resources needed
The program needs to add data science/analytics course(s) as well as more (and relevant) electives	Add the appropriate coursework in a 'Data Science' CPSC track and the 'Cybersecurity' CPSC track	It is felt that the current faculty would be capable of meeting this need, although platforms may be needed for exercises and virtual labs
There needs to be an additional team development project(s) in the Systems Analysis & Design class (CPSC/CIS 311) using the Agile development model along with something like GitHub for team collaboration	Add a team project with these features to the CPSC/CIS 311 class.	No additional resources needed
Devote more class time to complex logic/algorithms (adding coding exercise(s) to the Operating Systems class could be one area this is done)	Rather than add a separate course in logic or algorithms, increase the coverage of the more complex logic/algorithms in the required programming classes where logarithm complexity and programming constructs are taught	No additional resources needed
The assembler class (CPSC 215) needs to be done with a more relevant platform/machine	When a new faculty member takes over the CPSC 215 class, move to a different platform	A more relevant platform is needed for the coding
Reinstate the ACM student chapter when able	Each fall, examine the interest, numbers, and ability to reinstate the ACM student chapter	Minimal/no additional resources would be needed
Action	**Responsible Person**	**Timeline**
Starting with the sophomore year, determine if an advisee is planning to go to graduate school and strongly	Mitcham	Starting with advising in the FA 20 semester

advise him into the MATH 231, 232, and 331 classes.		
Add more complex code and algorithm coverage in the CPSC 111, 211 classes Add coding exercise(s) to the Operating Systems (CPSC 415) class so the students can actually implement the concepts talked about	Mitcham	Starting with the FA20 semester
Add Big Data and Data Science courses as part of the CPSC Data Science track Add Cryptography, ethical Hacking, Computer Forensics, and Cyber for Developers courses as part of the Cybersecurity Track (these can be electives for the general CPSC program)	Mitcham	Both the Data Science and the Cybersecurity tracks are available starting with the FA20 semester The new courses will be developed and taught when needed (this involves examining platforms that could be used for virtual labs/lab exercises)
Add a team project to the Systems Analysis & Design course (CPSC/CIS 311) using agile development and GitHub (or a similar app) for team collaboration	Harris	Recommended for the SP22 semester (or the next time that CPSC/CIS 311 is taught)
Evaluate the feasibility of reinstating the ACM Student Chapter	Mitcham	Starting with the FA20 semester

SECTION 4: Effectiveness

14. Most recent PLO assessment data/results: A Student learning Assessment Report (SLAR) was generated following the 2019/2020 academic year. That data and results follow:

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: 2020**

	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	Artifact Assessors: 1. Douglas Mitcham Assoc. Professor of Computer Science 2. Jeremy Harris, Assoc. Professor of Computer Information Systems
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: 1 Sophomores: 4 Juniors: 7 Seniors: 7 Graduate: 0 (These are CPSC majors used in the assessment, not sample size)
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		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	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 = 0) Ib CPSC 142 program (n = 5) Ic CPSC 211 algorithm lab (n = 3) Id CPSC 493 project grades (n = 6)

	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		(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)	IIa CPSC 215 program (n = 0) IIb CPSC 225 homework (n = 5) IIc CPSC 231 aux. storage quiz (n = 11) IId CPSC 225 quizzes (n = 5) IIIa CPSC 441 homework (n = 7) IIIb CPSC 415 homework (n = 0) IVa CPSC 231 team project (n = 11) IVb CPSC 441 paper (n = 7) IVc CPSC 415 oral report (n = 0) IVd CPSC 415 paper (n = 0)
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. The sample size for these items are listed as n = 0 above.	Evaluations were done just for CPSC majors. Evaluations include all courses from FA19 through SP20. In the reporting of results **NA** (Not Available) indicates that the class exercising the assessment instrument (or the instrument itself) was not offered during the 2019/2020 school year. 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**		Using 4 point scale rubrics, assessors scored student work on instruments above in Course Commons. Data were compiled for each PLO and summarized. **mean**	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		**scores on a scale of 1-4; 3+ considered proficient**	**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 exceptionally high.		Capstone project scores remained exceptionally high (and even improved) with the exception of the requirements phase, which dropped to 2.8. 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 (mean scores on a scale of 1-4; 3+ considered proficient)** I Algorithm Development & Implementation (overall average 3.5) Ia Analysis 2.8 Ib Implementation 3.5 Ic Development, implementation, and analysis 3.7		**Results of Assessment (mean scores on a scale of 1-4; 3+ considered proficient)** I Algorithm Development & Implementation (overall average 3.4) Ia Analysis 2.8 Ib Implementation 3.0 Ic Development, implementation, and analysis 3.1	**Results of Assessment (mean scores on a scale of 1-4; 3+ considered proficient)** I Algorithm Development & Implementation (overall average 3.5) Ia Analysis NA Ib Implementation 4.0 Ic Development, implementation, and analysis 2.0

	Id Capstone: - Proposal 4.0 - Requirements 3.6 - Design 3.3 - Code 3.7 - Demo 3.7 - Overall project: 3.6 II Computer Architecture & System Hardware (overall average 3.2) 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		Id Capstone: - Proposal 4.0 - Requirements 2.8 - Design 3.5 - Code 4.0 - Demo 4.0 - Overall project: 3.7 II Computer Architecture & System Hardware (overall average 4.0 but only includes IIa) 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	Id Capstone: - Proposal 4.0 - Requirements 3.8 - Design 3.5 - Code 3.8 - Demo 3.7 - Overall project: 3.8 II Computer Architecture & System Hardware (overall average 3.5) IIa Practical application NA IIb Practical knowledge: - Digital logic, circuits, and concept. machines 4.0 - Basic architect. 3.8 - Addressing 4.0 - The Processor 4.0 - I/O Org. NA - Memory 4.0 IIc Storage device knowledge 2.5 IId Computer component knowledge: - Digital logic, circuits, concept. machines 2.8 - Basic architect. 3.0 - Addressing 3.0 - The processor 4.0 - I/O Org. NA - Memory 3.4

	III System Software (overall average 3.5) 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		III System Software (overall average 3.6) 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	III System Software (overall average 3.5) IIIa Database Software: - Overview and evolution of DB management 3.4 - Data Models 3.7 - Intro to relational databases 3.3 - ER Modeling 3.7 - Advanced modeling 3.5 - Normalization 2.5 - Intro to SQL 3.9 - Advanced SQL 4.0 IIIb Operating system software: - Introduction NA - OS structures NA - Processes NA - Threads NA - CPU scheduling NA

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

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.	All four PLOs retain an overall level of 3.5 or greater. The overall capstone project (Id) score remained high (3.8) but the requirements component went from 2.8 to 3.8. This component was a target for improvement generated during the previous assessment. A target of the last assessment were the components of PLO IId. Previously, 4 of the 6 items were below 3.0. All are now at least 3.0 except the digital logic/circuits/conceptual machine item, which was 2.8.
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 lower than other areas and should be addressed.		Algorithm analysis (Ia) remained at 2.8 from the last assessment, short of the 3.0 goal. The requirements phase of the capstone project (Id) dropped from 3.6 to 2.8, short of the 3.0 goal.	Algorithm Development & Implementation (PLO I) overall remained high (3.5) but item Ic (Development, Implementation, and Analysis, assessed by CPSC 211 lab) dropped from 3.1 to 2.0.

			(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)	Computer Architecture & System Hardware (PLO II) overall remained high (3.5) but item IIc (assessed by CPSC 231 auxiliary Storage Device quiz) was 2.5 and item IId (CPSC 225 digital logic quiz component) was 2.8. System Software (PLO III) overall remained high (3.5) but item IIIa (CPSC 441 normalization quiz component) dropped from 3.4 to 2.5. All four PLOs remained well above 3.0. Each has multiple assessment tools. The above-mentioned items are just some of several assessment tools for each PLO.

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
Algorithm Analysis has been a target for improvement, specifically items Ia and Ic. Previous plans for improvement targeted the SP21 MATH 212 class (for item Ia). Ic was assessed during this SP20 semester in the CPSC 211 class. That assignment/tool was during the transition from seated to remote learning, which may have contributed to the lower grade. The plan would be to devote more time to the algorithm analysis portion of MATH 212 and CPSC 211 and provide more (or better) examples. This may include adding supplemental video material to Course Commons for the students to look at.	Changes to be implemented for MATH 212 and CPSC 211 in the SP21 semester.	Doug Mitcham
Although PLO II (Computer Architecture & System Hardware) overall scored 3.5, items IIc and IId graded below the desired 3.0 level. The plan would be to prioritize the information more, providing a greater	Changes to be implemented for the FA21 CPSC 231 class and the SP22 CPSC 225 class.	Doug Mitcham

emphasis on the important concepts/items that the quizzes will cover for the CPSC 231 auxilliary storage device quiz (for item IIc) and the CPSC 225 digital logic/circuits/ conceptual machine quiz (for item IId). This would more adequately prepare the students for those quizzes. The plan may also include adding supplemental video material to Course Commons for the students to look at.		
Although PLO III (System Software) overall scored 3.5, item IIIa graded below the desired 3.0 level. The plan would be to spend more time on normalization in the CPSC 441 class, going through more examples. The plan may also include adding supplemental video material to Course Commons for the students to look at.	Changes to be implemented for the FA21 CPSC 441 class.	Doug Mitcham

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.

- As a result of a prior peer review suggestion, transparencies used in CPSC classes (during this period, primarily the CPSC 225 File Processing class) have been converted to powerpoints, accessible for students through Course Commons. (SP20)

- During the last assessment period, the requirements phase of the capstone project (CPSC 493, PLO item Id) was a target for improvement. This requirements component improved to 3.8 (from 2.8). (SP20)

- As mentioned in the plans for the previous assessment period, an internship requirement was approved and added to the CPSC requirements and applied to all incoming CPSC majors during this assessment period. (FA19)

- A target of the last assessment were the components of PLO IId (computer component knowledge, as assessed by the CPSC 225 quiz scores). Previously, 4 of the 6 items were below 3.0. All are now at least 3.0 except the digital logic/circuits/conceptual machine item, which was 2.8. (SP20)

- Data Science and Cybersecurity tracks were developed and approved and will be available starting in the FA20 semester. (SP20)

- Course syllabi were converted to the required format. (FA19 and SP20)

- For the transition to remote learning for the CPSC 211 and CPSC 225 classes, additional content and videos were added to Course Commons along with auto-graded online quizzes/tests and practice questions/quizzes. This material could be used to enhance the future seated classes. (SP20)

- Rubrics were added and populated to assess course level outcomes (although no assessment analysis for CLOs have been done to date). (FA19 and SP20)

15. **Source of Professional Standards:** The CPSC program has been guided by several things as follows:
    - ACM (Association of Computing Machinery) Curricula Guidelines
    - SWOT Curriculum Advisory Committee recommendations
    - Student and Peer Reviews
    - Assessment data and analysis
    - Textbook updates reflecting the latest technological trends and developments

    The above items have been used for current and planned changes specified throughout this document. These changes reflect the areas of demand, interest, and technological change necessary to maintain the quality and relevancy of the CPSC program.

16. **Post-graduation placement of your graduates:** Since the previous APR in 2016, there have been 24 graduates. Of those 3 have gone on to graduate school successfully. All of the others have successfully entered industry. The CPSC program has a 100% success rate with regard to post-graduate employment and/or studies. The internship has helped in this regard. Of the 4 2020 graduates, 3 had jobs waiting for them upon graduation.

17. **Additional evidence of the program's quality and success:** Two different Curriculum Advisory Committees have been formed in the past (one for the SWOT analysis included in this report and a prior one for the previous SWOT analysis done in 2016). All members of those committees are current and former CPSC graduates representing a wide variety of technological environments and graduate schools. All have been successful in their endeavors and have been complimentary of the CPSC program in preparing them for their post-graduation pursuits. They have also made suggestions that have led to changes/additions to the program (as identified in the current and previous SWOT analyses). In addition to those committee members, contact has been maintained with graduates and successful employment confirmed. The SLAR and SWOT reports included in this report specify the various changes made (and planned) to the program, improving it for both current and future majors.

18. **The CPSC program does not have an A.A. Degree.**

SECTION 5: Sustainability

19. **Revenue Opportunities:** There are no revenue opportunities to report at this time.

20. **Resources:** Currently, the CPSC program has the personnel and technological resources to meet its needs. With the new tracks being implemented, there are some new courses being introduced. These courses should be able to be covered by the current faculty. The availability of on-line virtual labs may need to be examined for some courses (e.g., ethical hacking and computer forensics).

    The faculty member teaching the Assembly language Programming class (CPSC 215) will be retiring after the 2020/2021 academic year. It is believed that current faculty could pick up this course.

21. **Efficiencies beneficial to Evangel University:** Evangel's IT Department has benefitted from the CPSC majors. Many have done work-study/campus employment in the department. With the addition of the internship requirement to the CPSC program, several students have done internships in our IT Department. This has led some CPSC graduates to remain at Evangel, being employed by the IT Department full-time.

SECTION 6: Planning for the Future

22. **Strategic Objectives:** The EU strategic goal that the CPSC program has the most potential to positively affect is that of expanding our reach (enrollment growth). Enrollment growth can also be positively affected by strengthening industry's view (especially locally) of Evangel's CPSC program and graduates. With this is mind, the following items could help to accomplish this goal of enrollment growth:

    - Based on industry demand and SWOT feedback, make available cybersecurity and data science tracks for the CPSC students to choose from (with the generic CPSC program still being available). **(Completed in the 2019/2020 academic year and ready for fall 2020 incoming majors)**.

    - Promote the new CPSC tracks (as well as the CPSC program as a whole). The marketing and recruiting departments would be responsible for this. The web site has currently been updated to include the new tracks. More could be added. The recruiting personnel should make student CPSC prospects aware of these new tracks and the success of our graduates and the program as a whole. This should be done during the 2020/2021 academic year.

    - Reach out to local high school students. Various high school groups visited the EU campus during the 2019/2020 academic year, some meeting with Doug Miitcham to ask questions and here descriptions/comments regarding our CPSC program. This could be expanded into possible summer coding competitions/camps and/or more campus visits as time permits. Doug Mitcham would be the primary driver of this activity, aided by one or more additional CPSC or CIS faculty. Visits could be arranged as opportunities arise during the 2020/2021 academic year. Summer activities could possibly start in the summer of 2021.

    - Continue to have local company representatives visit campus to present opportunities within their companies (for internships and full-time, post-graduate employment). Doug Mitcham would be a primary driver for these visits, together with CIS faculty and the Career Services Department. These visits have occurred during the 2019/2020 academic year and should continue (and maybe even increase) during the 2020/2021 academic year.

ACADEMIC PROGRAM REVIEW (APR)

2019-2020

Mathematics

(Part A)

"Are we teaching the right things?"

SECTION 1: Introduction

1. **Department:** Natural and Applied Sciences
   Academic Program: Mathematics
   Program Coordinator: Dr. Don Tosh
   Academic Year of Review: 2019-2020

2. **Program Description:** The Mathematics program provides a broad knowledge of mathematics to students desiring to prepare for graduate studies in mathematics or work as professional mathematicians. All mathematics majors must complete a total of 33 credit hours of mathematics including 15 credit hours of upper division math credits.

3. **The following faculty teach one of more courses in the discipline:**
   Mrs. Dianne Twigger, MS in Mathematics (Missouri State University, 2008)
   Dr. Donald Tosh, PhD in Statistics (University of Alberta, 1981)

4. **Key stakeholders:** The key stakeholders in the program are the students participating in the program. Other stakeholders include employers of these students.

SECTION 2: Identity: Mission, Values and Strategic Plan

5. **Advancing the Mission:** Evangel University's mission statement is as follows:

   "Evangel University is a comprehensive Christian university committed to excellence in educating and equipping students to become Spirit-empowered servants of God who impact the Church and society globally."

   Evangel has identified the following goals:
   1) Lead academic innovation (academic excellence)

2) Nurture spiritual vitality (spiritual vitality)
3) Expand our reach (enrollment growth)
4) Invest in our future (fund development and campus improvement)
5) Foster stewardship (institutional health)

The above mission and goals encompass the values that are the heart of the university.
Some of the ways that the Mathematics program supports the above mission, goals, and values of the university follow:

In mathematics courses, students are receiving quality instruction as evidenced by higher than state average MoCA scores, and a higher than state average pass rate for the 9-12 mathematics exam required by the state of Missouri. Math education and mathematics students take the same courses so the scores of the math education students reflect the quality of math education overall. Also, we have a high acceptance rate for students applying to graduate school. All of our graduates in 2019 and 2020 who applied to graduate school were accepted either into mathematics graduate studies or an area related to their second major. Some of these graduates will go on to discover new results that will add to the academic outreach and impact they will have.

The Department of Natural and Applied Sciences sponsors several department chapels each semester. While led by department faculty, there is often significant student involvement. In addition, each faculty person integrates theology and their discipline wherever it is appropriate. Mathematics majors frequently join in these activities.

This program has not been significantly involved in fund development or campus improvement, other than producing loyal alumni who support the institution after graduation.

Institutional health is fostered by the production of mathematics teachers who holistically integrate the disciplines and practices of mathematics and Christian faith.

6. **Collaboration with other EU Programs**: The Mathematics major offers many courses that are required by other programs. All programs in the Natural and Applied Sciences Department have requirements of their majors in the mathematics area. There is a Common Core requirement that requires every student to take at least one math course. In a given semester there are only 6 or 7 credit hours of math courses offered that will only have math majors in them. The majority of course hours offered service a much broader audience than just the math program.

7. **Changes since the last APR:** The last APR was conducted from the 2015-2016 school year. Since that APR, a variety of changes have occurred in the program.
   - Changes were made to Math 212 (Discrete Mathematics) in order to incorporate more instruction on methods of proof, a topic that gives our majors more exposure to this topic.
   - A variety of technology has been incorporated into courses. In Math 334 (Foundations of Geometry) students learn to use Geogebra for various constructions. In Math 231 (Calculus 1) students learn to use Geogebra for tangent lines and graphing of polynomials. Geogebra is a widely used mathematics software package. Math 232 (Calculus 2) and Math 431 learn to use Mathematica to model real life situations.

8. **Adverse effect of elimination of the program:** As mentioned in item 6 above, even though enrolments are small in this program, almost all of the courses would still have to be offered in order to serve other programs. Eliminating the program would only involve a reduction of 6 or 7 credit hours of instruction per semester. Eliminating more instruction than that would have major detrimental effects in math education, applied math, and chemistry. Other program would have less, but still significant effects.

SECTION 3: Relevance

9. **Enrollment trends and demand:**

Enrollments in this major appear to be declining. Historically, the number of majors has been cyclic in nature. Part of the decline may be attributed to having recently broken mathematics into three tracks – applied math, math ed, and math. But efforts should be taken to try to recruit more students into this program. The approximate number of majors each fall for the previous four years is as follows.

- 2020: Spring 4 (2% of the dept. total)
- 2019: Spring 13 (6% of the dept. total) Fall 4 (2% of the dept. total)
- 2018: Spring 15 (8% of the dept. total) Fall 12 (5% of the dept. total)
- 2017: Spring 16 (7% of the dept. total) Fall 14 (6% of the dept. total)
- 2016: Spring 15 (6% of the dept. total) Fall 17 (6% of the dept. total)

According to the U.S. Bureau of Labor Statistics (BLS), "Employment of math occupations is projected to grow 26 percent from 2018 to 2028, much faster than the average for all occupations, which will result in about 47,700 new jobs. Growth is anticipated as businesses and government agencies continue to emphasize the use of big data, which math occupations can analyze." Evangel has just added "actuarial" and "big data" tracks to the math program which can take advantage of this demand and perhaps deal with the decline in enrollment.

10. **How the program has evolved in response to changing demands/needs:** The program requirements are linked to feedback obtained from graduates over the years, as well as the changing array of job opportunities for math graduates. The SWOT process has helped us sharpen this focus. We added an upper level stats course several years ago. More recently we increased the technology training for our students. This past semester (Spring 2020) we added course offerings that would provide for "Actuarial" and "Big Data" tracks in the math program.

11. **SWOT Analysis:** The most recent SWOT analysis for this program was conducted in June and July of 2020.

The 2020 Mathematics advisory committee consists of:

- Rebekah Chase, 2019 graduate. Ms. Chase is currently pursuing a PhD in mathematics at Purdue University.
- Kevin Grimes, 2016 graduate. Mr. Grimes is currently a Scientific Applications Software Engineer at the Jet Propulsion Lab and will be completing a masters degree in Software Engineering in the fall of 2020.
- Nick Hestand. 2012 graduate. Dr. Hestand was a double major in Chemistry and Mathematics and received his PhD is Chemistry for Temple University. He is currently an Assistant Professor of Chemistry at Evangel University.
- Christie Tosh, 1999 graduate. Ms. Tosh went on to get a masters degree in Mathematics, and taught at a private high school for several years. She is currently a Senior Actuarial Modeler with Allstate Insurance Company.

<u>Strengths Indicated by the Advisory Committee:</u>

- Passionate faculty who genuinely want their students to succeed.
- Strong theoretical foundation (real analysis, abstract algebra).
- Kappa Mu Epsilon.
- Caring, talented, and qualified faculty; a solid general scope of courses given the department's size.
- The attention given by the professors to the students is a huge strength. Since the department is small, you get to know your professors really well and it is evident that they take an interest in your life and future.
- All of the math professors I had while at EU were great communicators and teachers.
- The quality of instruction was excellent. The small class sizes were very nice. The professors cared greatly about their students and would go out of their way to help them.
- The mentorship I received during my time in the program was invaluable.

- I also felt the semester trips to conferences and KME/math club helped expose me to a broader world of math.
- The math lab is a great resource for students as well as a good opportunity for math majors.

Weaknesses Indicated by the Advisory Committee:

- Mainly, there were not enough professors or resources. There were few opportunities to for undergraduate research, especially when comparing math to the rest of the science department and Sigma Zeta. I have no complaints about the education I *did* receive, and don't get me wrong, I'm very grateful for my time studying there, I only feel that the department is lacking in how *much* they can offer. Everything the department had was great, there just wasn't enough – at least for students hoping to go to grad school. If the department wants to have a space for students on the road to grad school, they need to make some additions.
- Lack of applications to technology (modeling, etc.)
- Outdated programming applications (BASIC vs. R/MATLAB)
- The ability of the faculty, given its limited size, to offer additional courses related to specific fields of study; the lack of resources and support for professional guidance in the way of internships and research opportunities
- It would have been nice to have more opportunities to attend conferences to hear about current mathematics research. I attended two mathematics conferences while at EU, both at MSU, but would have enjoyed more.
- The number of faculty in the math department is small. While at EU, I had two professors for my math courses. Both were excellent, but I think it could have been useful to learn from a larger group of professors to gain exposure to a wider variety of perspectives on mathematics.

12. Opportunities & Threats:

Opportunities

Job opportunities abound for mathematicians, especially in the areas of statistics and big data. And the demand for mathematicians will continue to increase. Combined with the demand for mathematics education and applied math, we must make more prospective students aware of these opportunities for mathematicians. In the previous SWOT analysis in 2016, stakeholders asked for more technology to be incorporated into the program. Since all on our advisory committee graduated in 2017 or earlier, they did not get to experience many of the changes with regard to technology in the past few years. Regardless, the opportunity to continue to incorporate technology (especially free applets and software) is vital at this stage.

Threats

The recent downward trend in enrolment in this major is concerning. We cancelled one upper division course this past semester due to low enrollment. If this trend continue much longer, substantial steps will have to be taken.

It is difficult to recruit students into this major, due primarily to higher paying jobs in other fields and lack of awareness of students to the possibilities. Historically very little money and effort had been put toward marketing for the mathematics program. Given job growth anticipated by the bureau of labor and statistics, this should receive more attention from the university. We are hoping that the new actuarial and big data tracks appeal to more potential students. Generally, people don't know what actuarial science involves. However, the term "big data" has become something of a catchphrase and so might pique the interest of more interested students.

The financial state of Evangel University could be a threat to the program. Evangel is expecting a drop in enrollment this fall due to Covid-19. At present, there are 5 mathematics majors due to attend in the FA20 semester (more could be added before the start of the semester). A substantial decrease in enrollment in the mathematics program could make it difficult to maintain the

program, even considering the combined enrollments of mathematics, mathematics education, and applied mathematics. The upcoming school year will be critical for the mathematics program and Evangel overall.

13. **How strengths/opportunities can be used to overcome weaknesses/threats:**

Based on the SWOT analysis, tables specifying recommendations and action items determined to date are attached.

Finding	Recommendation	Resources Needed
All of the committee members recommended offering more upper division course offerings. Unfortunately, each of them suggested different courses.	Use the Topics course, Math 448, more regularly with topics that would appeal to current majors.	Staffing
Math students need familiarity with more useful programming languages.	Use R or Matlab in courses with programming components.	None.
Action	**Responsible Person**	**Timeline**
Change the language in Numerical Analysis to a more appropriate one.	Don Tosh	Spring 2021
Ask the recruiting office to publicize the new Actuarial and Big Data tracks that are available.	Don Tosh, Bill Cook, Mike Tenneson	Fall 2020

SECTION 4: Effectiveness

14. The most recent PLO data and assessment results are listed in the table below. Strengths, weaknesses, improvements, and suggestions for improvement are included in the table.

Department: Natural and Applied Sciences Program Coordinator: Don Tosh
Academic Program Evaluated: Mathematics Program Review Year: 2019-2020

	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:	*see previous document. This document was reformatted in 2019.	*see previous document. This document was reformatted in 2019.	*see previous document. This document was reformatted in 2019.	Dr. Don Tosh, full professor, program coordinator, and artifact assessor Mrs. Dianne Twigger, assistant professor and artifact assessor Mrs. Michelle Parker, adjunct faculty and artifact assessor.

program coordinator, reviewers, committee members, etc.)				
Number of students in sample: (If known, supply the number of students in each class/year who were used in the assessment report.)	Freshmen: Sophomores: Juniors: Seniors: Graduate:	Freshmen: Sophomores: Juniors: Seniors: Graduate:	Freshmen: Sophomores: Juniors: Seniors: Graduate:	Freshmen: 0 Sophomores: 1 Juniors:3 Seniors: 3 Graduate: 0
Instrument(s) used in assessment: (List the exams, standardized tests, portfolios, etc. that were used in the assessment process.)				Instruments are listed by outcome measured: Developing Problem Solving Skills: • Related Rates Quiz math 231 • Quiz 1 math 232 • Quiz 5 math 232 Improve Proof Techniques • Midterm math 212 • Exam 3 math 334 Improve Technological Skills • Homework assignment math 210 Model Real Life Phenomena • Homework assignment math 210 • Quiz math 210 • Quiz math 233
Additional Data: (List any additional information/data that informed this report.)				
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. A score of 3 or higher indicates mastery, and if a student is assessed on multiple assignments, the highest score

				prevails. Data was exported into excel for analysis.
Data: (Provide the graphs, charts, etc. that were used to show PLO data results. Do not include the raw data.)				**Results of Assessment (mean scores a scale of 0-4; 3+ considered proficien** Students are assessed on four themes (Program Level Outcomes) 1. Develop Problem Solving Skills (mean 4, n=1) 2. Model Real Life Phenomena (mean 2.8, n=5) 3. Improve Proof Techniques (mean 4, n=7) 4. Improve Technological Skills (mean 4 n=2)
Results of Assessment: (What evidence exists that the program helps students achieve learning outcomes? What changes have been made since the last APR to ensure that outcomes are achieved and what changes will be made to the program following this APR? What have you learned from assessing the changes?)				Based on the data above, students are achieving mastery on three of the four program level outcomes as they progress through the program. In previous years, sample size was much higher but was including non-majors who were also enrolled in these courses.
Strengths: (From the findings, list the areas of strengths that currently exist in the academic program.)				The program is generally meeting its goals in relation to mastery of outcomes. Data collection on improving proof techniques increased.
Areas in need of improvement: (From the findings, list the areas of weakness(s) that currently exist in the academic program.)				A weakness in modelling real life phenomena was noted. Due to splitting math majors into 3 categories (math, math ed, and applied math) the numbers in each category dropped substantially and led to only having reports in this outcome from one

				artifact. Hopefully we will get a more complete picture in future semesters to get a more comprehensive picture.
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.				Faculty need to look into other artifacts that will provide more information about this outcome. The one artifact used will be examined for extenuating circumstances and the material will be adjusted if necessary. Program coordinator and full-time faculty teaching in the program will re-evaluate program level outcomes for the following academic year.
Improvements made: (List completed improvement plans and dates of actual implementation.)				Data collection on improving proof techniques has increased, and all sections of courses on the curriculum map are now assessing program level outcomes.

15. **Standards that inform the program:** The mathematics program offers courses that follow the content recommendations of the Mathematical Association of America (Committee on the Undergraduate Program in Mathematics).

16. **Post-graduate Placement:** In the past 4 years, of the 5 program majors who applied to grad school all were accepted. Of the two program majors with double majors who applied to grad school in their other major, both were accepted. We do not track other graduates except anecdotally.

17. **Additional evidence of the program's quality and success:** Anecdotal comments from former students about the quality of our program**.**

18. **AA Degree:** There is no AA degree in mathematics.

SECTION 5: Sustainability

19. Revenue Opportunities: There has been one endowed scholarship created specifically for mathematics majors. There are no other revenue opportunities to report. Since the last APR, a small grant ($8000) was awarded to Evangel University so that we could purchase licensing for the Mathematica software used in some of our courses.

20. Resources: Currently, the Mathematics program has the personnel and technological resources to meet its needs.

21. Efficiencies beneficial to Evangel University: This program is a low cost program to maintain, due to the high overlap of courses with the Mathematics Education and the Applied Mathematics programs.

SECTION 6: Planning for the Future

22. Strategic Goals: The EU strategic goal that the mathematics program has the most potential to positively affect is that of expanding our reach (enrollment growth). The new program tracks, Actuarial and Big Data, have the potential to draw new students into the program and reverse the current enrollment decline. The people responsible for meeting this objective are: the program coordinator Don Tosh, Professor Dianne Twigger, Department chair Mike Tenneson, and the Enrollment and Recruitment Office. We are hoping for some visible results by the summer of 2021.

(Part B)
APR Rubric

Please click on the link below to complete the APR rubric. A PDF copy of the rubric will be uploaded to Course Commons in the department's file of APRs by the chair of Assessment.

https://forms.office.com/Pages/ResponsePage.aspx?id=OZSm9_ub6U-LC8HNW1BlvPeJHo7tNtRArCYed38MyBlURUZWVVJLV0MyNjAwOElLNzA5N0JPQ0dCRC4u

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ACADEMIC PROGRAM REVIEW (APR)

Mathematics Education

(Part A)

"Are we teaching the right things?"

SECTION 1: Introduction

19. **Department:** Natural and Applied Sciences
    Academic Program: Mathematics Education
    Program Coordinator: Mrs. Dianne Twigger
    Academic Year of Review: 2019-2020

20. **Program Description:** The Mathematics Education program represents a partnership between the Natural and Applied Sciences Department and the Education Department to provide a comprehensive major to prepare mathematics students for a career in secondary education. All mathematics education majors must complete a total of 37 credit hours of secondary education courses as listed under Department of Education, Secondary Education. Mathematics education majors must complete: a) the Mathematics Core Requirements and b) the subject certification track.

21. **The following faculty teach one of more courses in the discipline:**
    Mrs. Dianne Twigger, MS in Mathematics (Missouri State University, 2008)
    Dr. Donald Tosh, PhD in Statistics (enter information here)

22. **Key stakeholders:** The key stakeholders in the program are the students participating in the program. Other stakeholders include school district in which our graduates are employed and students within those districts.

SECTION 2: Identity: Mission, Values and Strategic Plan

23. **Advancing the Mission:** Evangel University's mission statement is as follows:

    "Evangel University is a comprehensive Christian university committed to excellence in educating and equipping students to become Spirit-empowered servants of God who impact the Church and society globally."

Evangel has identified the following goals:

1) Lead academic innovation (academic excellence)
2) Nurture spiritual vitality (spiritual vitality)
3) Expand our reach (enrollment growth)
4) Invest in our future (fund development and campus improvement)
5) Foster stewardship (institutional health)

The above mission and goals encompass the values that are the heart of the university.
Some of the ways that the Mathematics Education program supports the above mission, goals, and values of the university follow:

In mathematics courses, students are receiving quality instruction as evidenced by higher than state average MoCA scores, and a higher than state average pass rate for the 9-12 mathematics exam required by the state of Missouri. The university was awarded the highest number of points possible in this area when discussing program health. Students talk about current trends in mathematics education in their methods courses and learn to use current technology (mathematica and geogebra) in various courses.

The Department of Natural and Applied Sciences sponsors several department chapels each semester. While led by department faculty, there is often significant student involvement. In addition, each faculty person integrates theology and their discipline wherever it is appropriate. Mathematics education majors frequently join in these activities. The department of education also sponsors several chapels each semester that our students attend.

This program is based on strong interpersonal interactions. Enrolment growth is assisted by the personal testimonials of our graduates, and prospective students meeting with current majors. About 50% of our majors start in mathematics education, and the other 50% usually transfer into the program their first year at the university. Faculty knowledge and passion about the subject is often mentioned as the reason for changing to a mathematics education major.

This program has not been significantly involved in fund development or campus improvement, other than producing loyal alumni who support the institution after graduation.

Institutional health is fostered by the production of mathematics teachers who holistically integrate the disciplines and practices of mathematics and Christian faith.

24. **Collaboration with other EU Programs**: The Mathematics Education major encompasses required courses in the Education Department and the Natural and Applied Sciences Department, along with Common Core requirements. Mathematics education students have an advisor in the Natural and Applied Sciences Department and a liaison in the Education department to keep them on track with their academic programs. The program coordinator for the mathematics education program also attends education department meetings so ensure a seamless connection between the two departments.

25. **Changes since the last APR:** The last APR was conducted from the 2015-2016 school year. Since that APR, a variety of changes have occurred in the program.
    - Learning outcomes from the testing framework for the 9-12 mathematics Missouri Content Assessment (MoCA) were mapped to the appropriate courses and this documentation was provided to students to determine when they were ready for the MoCA. Study books were also bought for the department to loan to students prior to taking the certification exam.
    - Changes were made to Math 212 (Discrete Mathematics) in order to incorporate more instruction on methods of proof, a topic that is extremely useful for future geometry teachers

- A variety of technology has been incorporated into courses. In Math 334 (Foundations of Geometry) students learn to use geogebra for various constructions. In Math 231 (Calculus 1) students learn to use geogebra for tangent lines and graphing of polynomials. Geogebra is a software used by many public school districts. Math 232 (Calculus 2) and Math 431 learn to use mathematica to model real life situations.
- Math 336 (Instructional Methods in Mathematics 5-12) was redesigned to incorporate current trends. Guest speakers are used in the course as well to give students feedback on topics that are important in the current climate. Previous guest speakers have included first year teachers, seasoned teachers, department heads, and district math coordinators.
- Program level outcomes are assessed during each academic term to ensure the highest quality of instruction, and MoCA scores are recorded within the education department.

26. **Adverse effect of elimination of the program:** While enrolments are small in this program, graduates are very influential in the lives of their students. All of the courses in the program are offered for other majors in education, mathematics, and applied mathematics, so there is no educational cost for this major. If eliminated, EU would no longer produce HS math teachers. Eliminating the program could be detrimental to the secondary education program as a whole as it would limit the selection of content areas for prospective students and their families.

SECTION 3: Relevance

27. **Enrollment trends and demand:**

Enrollments in this major are remaining steady. The approximate number of majors each fall for the previous four years is as follows.

- 2019: 8 (4% of the dept. total)
- 2018: 7 (3% of the dept. total)
- 2017: 7 (3% of the dept. total)
- 2016: 10 (4% of the dept. total)

Employment opportunities for mathematics teachers continues to rise. Job prospects are expected to increase moderately for high school math teachers. The U.S. Bureau of Labor Statistics (BLS) predicted a job growth of 4% for secondary school teachers from 2018-2028 (*www.bls.gov*). This would be an increase of 38,200 jobs. The BLS attributed this projected growth to increased student enrollment as well as declining student-teacher ratios. According to the BLS, in 2018 the median annual salary for high school teachers was $60,320. The upper 10% earned $97,500 or more per year, while the lower 10% earned $39,740 or less.

28. **How the program has evolved in response to changing demands/needs:** The program requirements are linked to the Missouri Department of Elementary and Secondary Education requirements. As they change, so does our program. Faculty maintain close contact with former graduates and stakeholders, who express needs based on current classroom standards and expectations. We attempt to incorporate as much of this as possible in the program.

29. **SWOT Analysis:** The most recent SWOT analysis for this program was conducted in April and May of 2020.

The 2020 Mathematics education advisory committee consists of:

- Mrs. Rebecca Roche, 2016 graduate. Mrs. Roche has taught at Parkview High School in Springfield, Missouri, and currently teaches in Morocco.
- Mr. Ethan Grumke, 2017 graduate. Mr. Grumke has taught at two school districts in the Kansas City, Missouri area. He also coaches high school football for the district.
- Ms. Samantha Orr, 2017 graduate. Ms. Orr is certified to teach grades 5-12 She currently teaches 7th and 8th grade in Fair Grove, Missouri. She is also the department head for the middle school and middle school softball head coach,
- Mrs. Kaitlyn Czubkowski, 2016 graduate. Mrs. Czubkowski has taught at Central High School in Springfield, Missouri. She currently teaches in New Jersey.

Strengths Indicated by the Advisory Committee:

- The SciTech department did a good job at laying the necessary foundations in mathematics needed to help when giving instruction to high school students, especially when they ask when will this be used or how is this helpful to my everyday life. Specifically for the content assessment I was ready to take the test early on in my mathematics career before getting to some of the higher level math courses.
- The math department at Evangel is very good at being thorough in the scope of math taught to math and math education students. The professors are very knowledgeable in their fields which makes it easy for them to help college students when they are confused about a topic. Evangel's math department also is very intertwined with other science majors in the department itself which is exposure to other people and how they think and apply the math in their own field. I know that having friends in other majors but in my math class has helped me build on my on teaching skills sometimes as well as in my thinking skills when challenged to approach problems like they do.
- I felt beyond prepared for the content assessments. Evangel's math department did a great job placing classes to place students to be most successful for the content assessment. It was NOT an easy assessment.
- The main professors are fantastic, knowledgeable, and generally care about their students. Having the ability to choose some courses to focus on was fantastic and helpful in fitting in my schedule and for my interests. Linear Algebra, Senior Seminar, Engineering Physics (lecture not lab) and Differential Equations were some of my favorite courses.
- I had a wide range of mathematical ability and I am able to explain to students possible ways that math can be used beyond the classroom. I believe that the math curriculum prepared me well for my current courses.

Weaknesses Indicated by the Advisory Committee:

- Teaching math with technology. More practice with the use of technology in the math class specially.
- Some courses did not seem necessary for a math education degree such as CPSC 111 Intro to Computer Science or MATH 490 Readings in Math (History). The overall quality of professors was fantastic but a few courses were not effective or not taught well based on who the professor was (not one of the core math professors). I would rather have taken those courses with a competent professor.
- One weakness ever the math department could be its size however I don't think that that has really stopped any of the great things that have come out of the department. By this I mean having only two or three professors teaching all the math courses could become or could build a culture of independence from the other parts of the science department. Another weakness that the math department has is the lack of open communication with the education department in the types of courses that math education students need. However I do not believe this lack of communication is due to anything the math department is culpable for but rather it is the education department that does not work well with the math department to understand and fully equip math education students for all the challenges they may face.
- Sometimes it did feel like the higher-level math was not necessary if I did not want to pursue a higher math degree but it laid a good foundation if that is the route I would have chosen to go on.

30. Opportunities & Threats:

Opportunities

Job opportunities abound for mathematics teachers in this area. All of our graduates have landed jobs prior to or soon after graduating. Many teachers within our program have elected to stay in the area for at least some time after graduation. Their positive impacts in the school districts have created a favorable opinion of Evangel, and many students have had competing offers from more than one school district in the area prior to graduation.

In the previous SWOT analysis in 2016, stakeholders asked for more techonology to be incorporated into the program. Since all on our advisory committee graduated in 2017 or earlier, they did not get to experience many of the changes in regards to technology in the past few years. Regardless, the opportunity to continue to incorporate technology (especially free applets and software) is vital at this stage in education. In light of Covid-19, many school districts are now sharing open source material with one another, and this material can be incorporated into discussions and lessons here at Evangel.

Threats

While enrolment in this major is in an upward trend, it is still difficult to recruit students into this major, probably due higher paying jobs in other fields such as actuarial analysis or data science.

A second but critical threat to the program is how secondary education programs are marketed and organized at Evangel. Very little if any marketing money is spent on secondary education programs. Given job growth anticipated by the bureau of labor and statistics, this should receive more attention from the university. Also, the website and new student surveys are confusing for new and prospective students. For example, the website is not clear that secondary education majors are housed in the department that pertains to their content area. Many times new and prospective students pass through two or three advisors before reaching the correct advisor. This is unprofessional and has caused students frustration as they try to select a major. It may be impacting prospective students and their desire to come to the university if communication is not clear and quick.

The financial state on Evangel University could be a threat to the program. At present, there are 11 mathematics education majors due to attend in the FA20 semester (more could be added before the start of the semester). Administration has said that programs with under 20 majors could be targeted for elimination. From the number of mathematics education majors each fall (given previously in this report), the average number of majors is approximately 8 per year. Some years have had a large graduating class. This leaves a smaller number of majors if the incoming class is not large enough to replace those that graduated. Since the courses taught in this program are used by other mathematics, applied mathematics, and education majors, this number is not concerning as there are more than 20 students combined that need any given course in the program.

31. **How strengths/opportunities can be used to overcome weaknesses/threats:**

Based on the SWOT analysis, tables specifying recommendations and action items determined to date are attached.

Finding	Recommendation	Resources Needed
Beginning teachers want more training on low-cost, current technology that can help them effectively teach in the classroom.	Research and incorporate this technology in a variety of classes within the major.	Staffing, materials.
Communication problems in the Education Dept.	Establish regular communication channels to include mathematics faculty, education faculty, and students.	None.
Action	**Responsible Person**	**Timeline**
Include low-cost, current technology in courses within the major. Specific courses include Math 336, Math 231, Math 334, and Math 490.	Dianne Twigger	2020-2021 academic year.

Ask Education Dept. admin assistant to include science faculty in correspondences with science ed major students.	Dianne Twigger	Fall 2020

SECTION 4: Effectiveness

32. The most recent PLO data and assessment results are listed in the table below. Strengths, weaknesses, improvements, and suggestions for improvement are included in the table.

Department: Natural and Applied Sciences Program Coordinator: Dianne Twigger
Academic Program Evaluated: Mathematics Education Program Review Year: 2019-2020

	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.)	*see previous document. This document was reformatted in 2019.	*see previous document. This document was reformatted in 2019.	*see previous document. This document was reformatted in 2019.	Dr. Don Tosh, full professor and artifact assessor Mrs. Dianne Twigger, assistant professor, program coordinator, and artifact assessor Mrs. Michelle Parker, adjunct faculty and artifact assessor.
Number of students in sample: (If known, supply the number of students in each class/year who were used in the assessment report.)	Freshmen: Sophomores: Juniors: Seniors: Graduate:	Freshmen: Sophomores: Juniors: Seniors: Graduate:	Freshmen: Sophomores: Juniors: Seniors: Graduate:	Freshmen: 3 Sophomores: 3 Juniors:1 Seniors: 1 Graduate: 0
Instrument(s) used in assessment: (List the exams, standardized tests, portfolios, etc.				Instruments are listed by outcome measured:

that were used in the assessment process.)				Developing Problem Solving Skills: • Related Rates Quiz math 231 • Quiz 1 math 232 • Quiz 5 math 232 Improve Proof Techniques • Midterm math 212 • Exam 3 math 334 Improve Technological Skills • Homework assignment math 210 Model Real Life Phenomena • Homework assignment math 210 • Quiz math 210 • Quiz math 233
Additional Data: (List any additional information/data that informed this report.)				
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. A score of 3 or higher indicates mastery, and if a student

				is assessed on multiple assignments, the highest score prevails. Data was exported into excel for analysis.
Data: (Provide the graphs, charts, etc. that were used to show PLO data results. Do not include the raw data.)				**Results of Assessment (mean scores on a scale of 0-4; 3+ considered proficient)** Students are assessed on four themes (Program Level Outcomes) 5. Develop Problem Solving Skills (mean 3.5, n=4) 6. Model Real Life Phenomena (mean 4, n=3) 7. Improve Proof Techniques (mean 3.14, n=7) 8. Improve Technological Skills (mean 3.5 n=2)
Results of Assessment: (What evidence exists that the program helps students achieve learning outcomes? What changes have been made since the last APR to ensure that outcomes are achieved and what changes will be made to the				Based on the data above, students are achieving mastery on these four program level outcomes as they progress through the program. On previous

program following this APR? What have you learned from assessing the changes?)				years, sample size was much higher but was including non-majors who were also enrolled in these courses.
Strengths: (From the findings, list the areas of strengths that currently exist in the academic program.)				The program is meeting its goals in relation to mastery of outcomes. Data collection on improving proof techniques increased.
Areas in need of improvement: (From the findings, list the areas of weakness(s) that currently exist in the academic program.)				No major weaknesses noted. Due to covid and the transition to online classes, less data was collected for improving technological skills as students were unable to access campus software. Given that the pandemic has the potential to continue on into the next academic year, faculty should look into other options for meeting this objective.
Plans for improvement: (Provide the improvement plan, when it will be implemented, and person who will administer the improvement plan.)				Faculty need to look into alternative methods of technology that can be used in a hybrid or online format

*If an A.A. degree is part of this program, describe how the changes to this program affect the A.A. degree, if any.				to prepare for the upcoming school year. Program coordinator and full-time faculty teaching within the program will re-evaluate program level outcomes for the following academic year.
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.				Data collection on improving proof techniques has increased, and all sections of courses on the curriculum map are now assessing program level outcomes.

33. **Standards the inform the program:** The mathematics education program requirements are governed by the Missouri Department of Elementary and Secondary Education.

34. **Job Placement:** All students in the program since the date of the last APR (2015-2016) have been placed within 3 months of graduation. Many students receive job offers up to two months prior to graduation.

35. **Additional evidence of the program's quality and success:** Anecdotal comments from principals about the quality of our graduates**.** A large number of our graduates choose to complete their master's program at Evangel.

36. **AA Degree:** There is no associated AA degree.

SECTION 5: Sustainability

37. What new revenue opportunities have been (or can be) beneficial to the program? Describe any supporting funding from subsidies, grants, fundraising, etc.
38. To what extent does the program have the personnel, technological, and other resources it needs to meet its objectives?
39. What efficiencies in the way the program operates are (or can be) beneficial to Evangel University as a whole?

19. Revenue Opportunities: There are no revenue opportunities to report at this time. Since the last APR, a small grant ($8000) was awarded to Evangel University so that we could purchase licensing for the mathematica software used in some of our courses.

20. Resources: Currently, the Mathematics Education program has the personnel and technological resources to meet its needs. It would be beneficial to have a small budget to bring in guest speakers from the surrounding area.

21. Efficiencies beneficial to Evangel University: This program is good PR to the education community that our graduates make great teachers. Given that these courses are all needed by other programs, it is a low cost program to maintain.

SECTION 6: Planning for the Future

40. **Strategic Goals:** The EU strategic goal that the mathematics education program has the most potential to positively affect is that of expanding our reach (enrollment growth). Enrollment growth can also be positively affected by promoting this program through EU promotional campaigns. This can be achieved by a partnership with the program coordinator, chair of the education department, the enrollment office, and the marketing office. For low cost, past students can be featured in print and social media, highlighting the effectiveness of the program.

The mathematics education program can also contribute to leading academic innovation by incorporating many of the current educational trends into the classroom. Since most public school systems are underfunded, it is important to teach students creative ways to make positive impacts in a classroom with less physical resources. This can be completed by current faculty teaching in the program.

(Part B)
APR Rubric

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