NAME OF SCHOOL OR DEPARTMENT:
Mathematical, Information and Computer Sciences
Update January 23, 2015

ACTION ITEMS/SUBSTANTIVE CHANGES INCLUDE: addition/deletion of courses, additions/deletions of a major, changes in degree requirements and changes in general education requirements.

I.   List proposal(s) with a one line abstract (examples):

Proposal I: Remove CSC181 (1) Excel from the catalog (simple proposal).

Proposal II: Remove MTH463 (3) Secondary Mathematics Methods from the catalog and substitute EDU 433 (3) Methods for Teaching Secondary Mathematics for this class in our list of requirements for prospective teachers (simple proposal).

Proposal III: Changing the pre-requisites on CSC481/ISS481/MTH481 Senior Seminar to better prepare students for the activities in the class (this change is really focused at December grads) (simple proposal).

Proposal IV: Change the description of MTH113 (3) Intermediate Algebra to bring it into alignment with what other schools are doing (adding a few topics) (simple proposal).

Proposal V: Create two new classes to better address the needs of business majors MTH173 (3) Business Calculus and MTH153 (3) Mathematical Analysis for Business and Economics. These classes would replace the role of MTH123 Elementary Functions in the business curriculum. This change does not increase the number of units of mathematics that business majors must take, but it does provide courses more appropriate for their discipline.

Proposal VI: Remove MTH123 (3) Pre-Calculus Mathematics from the catalog. Change the name of MTH133 (3) Pre-Calculus for the Sciences to MTH133 Pre-Calculus (simple proposal).

Proposal VII: In order to update the current Computer Science and Computer Information Systems Degrees (see Proposals X and XI) remove the following courses from the Catalog:
        CSC 133 - Introduction to Computer Science and Information Systems (3) (annual)
        CSC 354 - Design and Analysis of Algorithms (4) (alternating year)
        CSC 422 - Theory of Computation (2) (alternating year)
        ISS 242 - Visual Programming for Business Applications (2) (alternating year)
        ISS 424 - Internet Applications Development (4) (alternating year)

Proposal VIII: In order to update the current Computer Science and Computer Information Systems Degrees (see Proposals X and XI) add the following courses to the Catalog:
> CSC 252 – Data Structures in C++ (2) (annual, no impact because this is the first half of CSC254)
> ISS 123– Introduction to Information Systems (3) (annual class)
> ISS 342 – Project Management and Quality Assurance (2) (alternating year)
> ISS 493 – Information Systems Project (3) (alternating year).

Proposal IX: In order to update the current Computer Science and Computer Information Systems Degrees (see Proposals X and XI) modify the following courses in the Catalog:
> CSC 153 (3) to become CSC 154 – Object Oriented Programming (4) (annual)
> CSC 254 Data Structures and Algorithm Analysis (4) (annual)
> CSC314 Operating Systems (4) annual
> CSC 324 Software Engineering (4) to be reduced by one unit to CSC 323 Software Engineering (3) (alternating year class)
> Change CSC 374 Computer Networking and Security (4) to align with Information Systems standards. This is a more hands on and practical approach. The course will be called ISS 373 Networking and Security (3) (alternating year).
> Change ISS 414 - Data Base Management Systems (4) to more specifically combine data base and information management with some web applications. It will now be called Data Base Systems and Web Integration (4).

Proposal X: Make small modifications to the following majors: Computer Science BS, Computer Science: Software Engineering BS, Computer Science BA. These are changes that bring our curriculum into alignment with the most recent set of Association of Computing Machinery curriculum standards. They also reflect any overlapping changes with the degree in Information Systems. The modified degrees are called Computer Science: Technical Applications BS, Computer Science: Software Engineering BS, Computer Science: Software Engineering BA.

Proposal XI: Modify the Computer Information Systems BS. The new degree will be called Information Systems BS. This will be a joint major with the Fermanian School of Business and thus needs to meet the standards to be ACBSP accredited along with all other FSB undergraduate degrees. It is also aligned with ACM standards for computing majors with an emphasis in information systems.

Proposal XII: Make minor modifications to the Mathematics BS and BA to reflect the changes in computer science classes and to correct a typographical error in the number of electives.

Proposal XIII: Make minor modifications to the computational science minors to reflect the changes in computer science classes.

II. **Rationale:** Each proposal needs thorough explanations as to why the change is being suggested. Please answer the following questions in your rationale as indicated. COMPLEX proposals would be considered as an addition (or deletion) of major, minors or extensive changes to a major or minor. SIMPLE proposals would be those dealing with either adding or dropping of one or two courses to a major or minor, or adding or deleting an elective, etc.

Proposal I: Remove CSC181 (1) Excel from the catalog (simple proposal)

1.	How has assessment data informed the proposed change and how recently has your department or school completed a program review? For example, have alumni, outside reviewers, etc., suggested improvements? (complex and simple proposals)

This class has been in the catalog but due to low enrollments, we have not taught it in the last year. The prioritization process asked that we remove the class permanently from our list of offerings.

2.	What are comparable universities and colleges doing? (complex and simple proposals)

This was a unique one-unit class created to assist the School of Business in preparing students to take accounting. Since the School of Business is no longer requiring this of their students, we are eliminating it.

3.	Is the change related to stipulations imposed by outside accrediting agencies (addressing standards, etc.) or licensure? Or, have these agencies been consulted to assure compliance with standards? (complex proposals)
N/A

4.	How does the proposed change relate to the mission of the university? (complex proposals)
N/A

5.	How does the change accommodate the department or school's learning outcomes for the major, minor, concentration, etc.? For instance, does the change help balance out the curriculum, or does it fill in a missing gap that would help strengthen the program? Does it add breadth or depth, etc.? (complex and simple proposals)

This does not impact department learning outcomes.

6.	What impact will it have on the size of the major, minor, etc.? (complex proposals)

None.

7.	Is there evidence that this change would enhance enrollment or generate new revenue? Please explain. (complex and simple proposals)

We are eliminating this class to produce savings.

8. How does the proposal(s) address the PLNU strategic plan? (complex proposals)

N/A

9. State other rationale that you deem appropriate. (complex and simple proposals)

N/A

Proposal II: Remove MTH463 (3) Secondary Mathematics Methods from the catalog and substitute EDU433 (3) Methods for Teaching Secondary Mathematics for this class in our list of requirements for prospective teachers (simple proposal)

> 1.   How has assessment data informed the proposed change and how recently has your department or school completed a program review? For example, have alumni, outside reviewers, etc., suggested improvements? (complex and simple proposals)
>
> This class has been in the catalog but due to low enrollments, in the 2014-15 academic year we are not teaching the class and have had students enroll for EDU433 Methods for Teaching Secondary Mathematics. The prioritization process asked that we remove the class permanently from our list of offerings.

> 2.   What are comparable universities and colleges doing? (complex and simple proposals)
>
> Depending on the school, this class has been offered either in the Mathematics Department or the School of Education. So this change is consistent with national practices.

> 3.   Is the change related to stipulations imposed by outside accrediting agencies (addressing standards, etc.) or licensure? Or, have these agencies been consulted to assure compliance with standards? (complex proposals)
> N/A

> 4.   How does the proposed change relate to the mission of the university? (complex proposals)
> N/A

> 5.   How does the change accommodate the department or school's learning outcomes for the major, minor, concentration, etc.? For instance, does the change help balance out the curriculum, or does it fill in a missing gap that would help strengthen the program? Does it add breadth or depth, etc.? (complex and simple proposals)
>
> This does not impact department learning outcomes.

> 6.   What impact will it have on the size of the major, minor, etc.? (complex proposals)
> None.

> 7.   Is there evidence that this change would enhance enrollment or generate new revenue? Please explain. (complex and simple proposals)
>
> We are eliminating this class to produce savings.

> 8. How does the proposal(s) address the PLNU strategic plan? (complex proposals)
>
> N/A
>
> 9. State other rationale that you deem appropriate. (complex and simple proposals)
>
> N/A

Proposal III: Changing the pre-requisites on CSC481/ISS481/MTH481 (1) Senior Seminar to better prepare students for the activities in the class (this change is really focused at December grads) (simple proposal).

1.　　How has assessment data informed the proposed change and how recently has your department or school completed a program review? For example, have alumni, outside reviewers, etc., suggested improvements? (complex and simple proposals)

Our senior seminar makes use of students' "integrative experience" which is one of: Service Learning (ISS496 and ISS497, CSC496 and CSC497, MTH496 and MTH497), Honors Research (HON498 and HON499), Independent Research (ISS498 and ISS499, CSC498 and CSC499, or MTH498 and MTH499) or Internship (ISS472). We are finding that our December grads, who must take Senior Seminar the spring before they graduate have not always begun their integrative experience which causes problems in the assessment process. This minor change in the class description will correct that problem.

2.　　What are comparable universities and colleges doing? (complex and simple proposals)

This is a simple pre-requisite change so we didn't do any comparable research.

3.　　Is the change related to stipulations imposed by outside accrediting agencies (addressing standards, etc.) or licensure? Or, have these agencies been consulted to assure compliance with standards? (complex proposals)
N/A

4.　　How does the proposed change relate to the mission of the university? (complex proposals)
N/A

5.　　How does the change accommodate the department or school's learning outcomes for the major, minor, concentration, etc.? For instance, does the change help balance out the curriculum, or does it fill in a missing gap that would help strengthen the program? Does it add breadth or depth, etc.? (complex and simple proposals)

This does not impact department learning outcomes.

6.　　What impact will it have on the size of the major, minor, etc.? (complex proposals)
None.

7.　　Is there evidence that this change would enhance enrollment or generate new revenue? Please explain. (complex and simple proposals)
No changes.

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8. How does the proposal(s) address the PLNU strategic plan? (complex proposals)
N/A

9. State other rationale that you deem appropriate. (complex and simple proposals)
N/A

Below is the updated catalog copy for CSC418, ISS418 and MTH418:

Catalog Copy (Present)	Catalog Copy (New)
ISS481 (1) Senior Seminar in Computer Information Systems This one-unit capstone course is a seminar in which faculty members, some guests and the students give lectures on topics of general interest in computer information systems. Graded Credit/No Credit. *Prerequisite(s):* Senior standing (or Junior standing if a December graduate).	**ISS481 (1) Senior Seminar in Computer Information Systems** This one-unit capstone course is a seminar in which faculty members, some guests and the students give lectures on topics of general interest in computer information systems. Graded Credit/No Credit. *Prerequisite(s):* One of CSC496, CSC498, ISS496, ISS498, MTH496, MTH498, HON498 or ISS472 and Senior standing (or Junior standing if a December graduate).
CSC481 (1) Senior Seminar in Computer Science This one-unit capstone course is a seminar in which faculty members, some guests and the students give lectures on topics of general interest in computer science. Graded Credit/No Credit. *Prerequisite(s):* Senior standing (or Junior standing if a December graduate).	**CSC481 (1) Senior Seminar in Computer Science** This one-unit capstone course is a seminar in which faculty members, some guests and the students give lectures on topics of general interest in computer science. Graded Credit/No Credit. *Prerequisite(s):* One of CSC496, CSC498, ISS496, ISS498, MTH496, MTH498, HON498 or ISS472 and Senior standing (or Junior standing if a December graduate).
MTH481 (1) Senior Seminar in Mathematics This one-unit capstone course is a seminar in which faculty members, some guests and the students give lectures on topics of general interest in mathematics. Graded Credit/No Credit. *Prerequisite(s):* Senior standing (or Junior standing if a December graduate).	**MTH481 (1) Senior Seminar in Mathematics** This one-unit capstone course is a seminar in which faculty members, some guests and the students give lectures on topics of general interest in mathematics. Graded Credit/No Credit. *Prerequisite(s):* One of CSC496, CSC498, ISS496, ISS498, MTH496, MTH498, HON498 or ISS472 and Senior standing (or Junior standing if a December graduate).

Proposal IV: Change the description of MTH113 (3) Intermediate Algebra to bring it into alignment with what other schools are doing (adding a few topics) (simple proposal)

> 1.   How has assessment data informed the proposed change and how recently has your department or school completed a program review? For example, have alumni, outside reviewers, etc., suggested improvements? (complex and simple proposals)
>
> Our department is in the middle of a review process of our GE offerings and also looking at course transfer issues. What our research has highlighted is our MTH113 (3) Intermediate Algebra does not align with what other schools in our region are doing. The class is missing two core mathematical topics: (a) conic sections and (b) sequences and series. We believe that making this change will have two benefits:
> - Make transfer equivalences easier to identify.

- Provide a sufficient foundation for Business Calculus (see Proposal V) without the need for pre-calculus (this has to do with the limited range of topics covered in Business Calculus).

2.   What are comparable universities and colleges doing? (complex and simple proposals)

This change brings us into alignment with what other schools are doing.

3.   Is the change related to stipulations imposed by outside accrediting agencies (addressing standards, etc.) or licensure? Or, have these agencies been consulted to assure compliance with standards? (complex proposals)
N/A

4.   How does the proposed change relate to the mission of the university? (complex proposals)
N/A

5.   How does the change accommodate the department or school's learning outcomes for the major, minor, concentration, etc.? For instance, does the change help balance out the curriculum, or does it fill in a missing gap that would help strengthen the program? Does it add breadth or depth, etc.? (complex and simple proposals)

This does not impact department learning outcomes.

6.   What impact will it have on the size of the major, minor, etc.? (complex proposals)
None.

7.   Is there evidence that this change would enhance enrollment or generate new revenue? Please explain. (complex and simple proposals)

We expect that due to the added topics a limited number of students will not waive MTH113. To cover this contingency, we plan on teaching one section of this each semester. This will be offset from savings coming from a reduced number of business students in MTH123, MTH303 (see proposal V for an overall computation of impact of the proposed changes to mathematics requirements for business students).

Note that currently the only students who must wave MTH113 are students who need pre-calculus (Business, Biology, Chemistry, Mathematics, Computer Science, Computer Information Systems, Physics and Physics/Engineering majors) or students who are preparing to be elementary school teachers (MTH113 is a pre-requisite for the two-semester sequence of mathematics for elementary teachers). Note the two topics that are being added to MTH113 are ones that prospective teachers are expected to know.

8. How does the proposal(s) address the PLNU strategic plan? (complex proposals)
N/A

9. State other rationale that you deem appropriate. (complex and simple proposals)

In additional to bringing PLNU into alignment with other schools in the region, it will also allow

students to move to Business Calculus without taking pre-calculus. This provides a set of mathematics classes better suited to students studying business and also supports the inter-disciplinary Science/Technology/Business majors being proposed jointly between the departments in Rohr Science and the School of Business (see School of Business proposal).

Below is the updated catalog copy for MTH113:

Catalog Copy (Present)	Catalog Copy (New)
MTH 113 (3) Intermediate Algebra A review and extension of elementary algebra, solutions of linear and quadratic equations, radicals, inequalities, linear and quadratic functions, polynomial functions, exponential and logarithmic functions, and graphing. Offered every fall semester. *Prerequisite(s)*: MTH 099 (or equivalent).	**MTH 113 (3) Intermediate Algebra** A review and extension of elementary algebra, solutions of linear and quadratic equations, radicals, inequalities, linear and quadratic functions, polynomial functions, exponential and logarithmic functions, conic sections, sequences and series and graphing. Offered every ~~fall~~ semester. *Prerequisite(s)*: MTH 099 (or equivalent).

Proposal V: Create two new classes to better address the needs of business majors MTH173 (3) Business Calculus and MTH153 (3) Mathematical Analysis for Business and Economics. These classes would replace the role of MTH123 Elementary Functions in the business curriculum. This change does not increase the number of units of mathematics that business majors must take, but it does provide courses more appropriate for their discipline.

1.   How has assessment data informed the proposed change and how recently has your department or school completed a program review? For example, have alumni, outside reviewers, etc., suggested improvements? (complex and simple proposals)

Our department is in the middle of a review process of our GE offerings and also looking at course transfer issues. As part of prioritization our department was asked to look at implementing some changes in GE. Adding a business calculus was one of the components of the plan that MICS submitted as part of the prioritization process. MICS has had a long-term concern about the suitability of teaching pre-calculus to business students (MTH123 or MTH133) which is required by the School of Business. After conversation with the School of Business and looking at best practices in business education we are proposing two options for students in the school of business:
- (A) MTH173 (3) Business Calculus with a pre-requisite of MTH113 (see proposal IV). This is the class that the School of Business will be recommending for all students and strongly recommending for Accounting, Economics and Finance majors and those intending to earn an MBA. This calculus class will have MTH113 (see Proposal IV) as a prerequisite. Our intent is to ask the GE committee to add this course to the list of GE mathematics options. If we obtain GE approval for this calculus course, this will replace both MTH123 (3) <u>and</u> MTH303 (3) for business majors who choose this option.
- (B) MTH153 (3) Mathematical Analysis for Business and Economics. This class would replace MTH123 (3) or MTH133 (3) for business majors and have MTH113 as a pre-requisite (this is the same pre-requisite as MTH123 and MTH133). They would still need to take MTH303 to satisfy their general education requirements.

Note that this course pattern and the GE options were designed in collaboration with the School of Business. It is also important to note that business calculus is not sufficient for any scientific major and that is standard national practice.

2.   What are comparable universities and colleges doing? (complex and simple proposals)

This change brings us into alignment with what other schools are doing for business students. Many, but not all, require a business calculus class for their business majors.

3.   Is the change related to stipulations imposed by outside accrediting agencies (addressing standards, etc.) or licensure? Or, have these agencies been consulted to assure compliance with standards? (complex proposals)

Not the result of requirements from accrediting agencies. However it has been verified that this change would keep the School of Business majors within ACBSP accreditation.

4.   How does the proposed change relate to the mission of the university? (complex proposals)
N/A

5.   How does the change accommodate the department or school's learning outcomes for the major, minor, concentration, etc.? For instance, does the change help balance out the curriculum, or does it fill in a missing gap that would help strengthen the program? Does it add breadth or depth, etc.? (complex and simple proposals)

This does not impact department learning outcomes.

6.   What impact will it have on the size of the major, minor, etc.? (complex proposals)

No impact in MICS. Option (B) is a substitution for School of Business majors. If GE approval is obtained Option (A) will allow business students to satisfy both a major and GE requirement with the same course.

7.   Is there evidence that this change would enhance enrollment or generate new revenue? Please explain. (complex and simple proposals)

We expect this to be course section neutral and it may provide a small savings. The analysis is given below.

8. How does the proposal(s) address the PLNU strategic plan? (complex proposals)
N/A

9. State other rationale that you deem appropriate. (complex and simple proposals)

This change will provide more focused and discipline specific mathematical preparation for our business students. Both MICS and the School of Business believe that this coursework will better serve their students and more adequately prepare them to pursue MBA.

Catalog Copy for MTH173 (3) Business Calculus

Catalog Copy (Present)	Catalog Copy (New)
	MTH173 (3) Business Calculus (GE) A calculus course intended for those studying business, economics, or other related business majors. This is course covers differential and integral calculus of elementary functions with an emphasis on business applications. This is a brief calculus course and not appropriate for students majoring in science, computer science or mathematics. *Prerequisite* MTH113 or equivalent.

Tentative Syllabus/Course Learning Outcomes for MTH173 (3) Business Calculus (GE):
If you are proposing new courses, please include a tentative syllabus with course learning outcomes. This should not include textbooks, calendar, etc., but merely an idea of what the course content will include as well as what you hope the student will accomplish by the end of the course. **State at least four course learning outcomes (CLO's).**

> **Syllabus:** Here is a bulleted set of topics that will be covered in the course:
> - Differentiation of elementary functions
> - Integration of elementary functions
> - Specific applications:
>   - Marginal functions (cost, demand)
>   - Optimization
>   - Price, demand and revenue
>   - Elasticity of demand
>   - Consumer and producer surplus
>   - Joint revenue, cost and profit
>
> **Outcomes:** Here are the course learning outcomes:
>
> *GE Outcomes:*
> - Students will be able to formulate a mathematical model from a verbal description of a problem.
> - Students will be able it solve non-routine problems using logic and quantitative techniques.
> - Students will be able to construct solutions to problems using computational techniques
>
> *Additional Course Outcomes:*
> - Students will differentiate elementary functions
> - Students will integrate elementary functions
> - Students will be able to apply differentiation and integration to solve business problems.

Catalog Copy for MTH153 (3) Mathematical Analysis for Business and Economics

Catalog Copy (Present)	Catalog Copy (New)
	MTH153 (3) Mathematical Analysis for Business and Economics This course focuses on learning and using basic mathematical tools that are fundamental to business applications. Applications of these tools include: supply and demand, optimization, cost-benefit analysis, equilibrium (systems of equations), interest, and loan amortization. *Prerequisite* MTH113 or equivalent.

Tentative Syllabus/Course Learning Outcomes for MTH153 (3) Mathematical Analysis for Business and Economics:
If you are proposing new courses, please include a tentative syllabus with course learning outcomes. This should not include textbooks, calendar, etc., but merely an idea of what the course content will include as well as what you hope the student will accomplish by the end of the course. **State at least four course learning outcomes (CLO's).**

Syllabus: Here is a bulleted set of topics that will be covered in the course:
- Review of algebraic functions
- Review of inequalities and solutions to equations
- Applications of algebra to the following business topics:
    - Cost-Benefit Analysis
    - Supply & Demand
    - Consumption Function
    - Optimization
    - Consumer & Producer Behavior
    - Marginal Conditions
    - Equilibrium
    - Interest
    - Loan Amortization

Outcomes: Here are the course learning outcomes:
- Students will be able to use algebra to solve supply and demand problems.
- Students will be able to use algebra to solve optimization problems.
- Students will be able to describe consumer and producer behavior mathematically.
- Students will be able to use mathematics to solve problems related to finance (interest, loans, and amortization).

Proposal VI: Remove MTH123 (3) Pre-Calculus Mathematics from the catalog. Change the name of MTH133 (3) Pre-Calculus for the Sciences to MTH133 Pre-Calculus (simple proposal).

1. How has assessment data informed the proposed change and how recently has your department or school completed a program review? For example, have alumni, outside reviewers, etc., suggested improvements? (complex and simple proposals)

MTH123 Pre-Calculus Mathematics is the version of pre-calculus has been taught for business majors. This course is being replaced by MTH153 (3) or MTH173 (3) in the FSB curriculum and is no longer necessary. Students in other majors needing pre-calculus will take MTH133 (3) Pre-Calculus Mathematics for the Sciences, now to be called MTH133 (3) Pre-Calculus.

2. What are comparable universities and colleges doing? (complex and simple proposals)

This brings us into alignment with common practice.

3. Is the change related to stipulations imposed by outside accrediting agencies (addressing standards, etc.) or licensure? Or, have these agencies been consulted to assure compliance with standards? (complex proposals)
N/A

4. How does the proposed change relate to the mission of the university? (complex proposals)
N/A

5. How does the change accommodate the department or school's learning outcomes for the major, minor, concentration, etc.? For instance, does the change help balance out the curriculum, or does it fill in a missing gap that would help strengthen the program? Does it add breadth or depth, etc.? (complex and simple proposals)

This does not impact department learning outcomes.

6. What impact will it have on the size of the major, minor, etc.? (complex proposals)
None.

7. Is there evidence that this change would enhance enrollment or generate new revenue? Please explain. (complex and simple proposals)

This chance is revenue and cost neutral. It may produce some savings. See the excel analysis below for details.

8. How does the proposal(s) address the PLNU strategic plan? (complex proposals)
N/A

9. State other rationale that you deem appropriate. (complex and simple proposals)
N/A

Analysis of Impact on MICS Teaching Load:

The table below provides an analysis of the impact of the changes in Proposals IV, V and VI on the number of sections of mathematics taught by MICS. Note that this change is unit neutral. If there is an increase in the number of students taking Business Calculus, we may be able to drop one additional section of MTH303.

<table>
<tr><td colspan="6">Business Class Change Section Analysis</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Current:</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>Number of units for class</td><td>Sections per year</td><td>Number Business Students*</td><td>Total Enrollment</td><td>Non-Business Students</td></tr>
<tr><td>MTH113</td><td>3</td><td>1</td><td>9</td><td>21</td><td>12</td></tr>
<tr><td>MTH123 (FR year)</td><td>3</td><td>3</td><td>83</td><td>102</td><td>19</td></tr>
<tr><td>MTH133</td><td>3</td><td>1</td><td>3</td><td>25</td><td>22</td></tr>
<tr><td>MTH303</td><td>3</td><td>10</td><td>53</td><td>315</td><td>262</td><td>Note that in 2014-15 we tried going down from 11 annual sections to 10</td></tr>
<tr><td></td><td></td><td>15</td><td></td><td></td><td></td></tr>
<tr><td colspan="6">* Note that there were fewer business majors in MTH303 than is typical. This had to do with a drop in the number of business majors in the recession. Those enrollments are climbing again.</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="6">Proposed: Assuming one half of business majors choose business calculus to replace MTH123</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>MTH113 (F/S)</td><td>3</td><td>2</td><td>50</td><td></td><td></td><td>Added topics on MTH113 means more students will need it, so we will teach one section per semester.</td></tr>
<tr><td>MTH123</td><td>3</td><td>0</td><td>0</td><td></td><td></td></tr>
<tr><td>MTH133 (F/S)</td><td>3</td><td>2</td><td>41</td><td></td><td></td><td>1 section per semester</td></tr>
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<tr><td>MTH173 (F/S)</td><td>3</td><td>2</td><td>42</td><td></td><td></td><td>1 section per semester</td></tr>
<tr><td>MTH303</td><td>3</td><td>7</td><td>220</td><td></td><td></td></tr>
<tr><td></td><td></td><td>15</td><td></td><td></td><td></td></tr>
</table>

Proposal VII: In order to update the current Computer Science and Computer Information Systems Degrees (see Proposals X and XI) <u>remove</u> the following courses from the Catalog:
  CSC 133 - Introduction to Computer Science and Information Systems (3) (annual)
  CSC 354 - Design and Analysis of Algorithms (4) (alternating year)
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  ISS 242 - Visual Programming for Business Applications (2) (alternating year)
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  Change ISS 414 - Data Base Management Systems (4) to more specifically combine data base and information management with some web applications. It will now be called Data Base Systems and Web Integration (4).

Proposal X: Make small modifications to the following majors: Computer Science BS, Computer Science: Software Engineering BS, Computer Science BA. These are changes that bring our curriculum into alignment with the most recent set of Association of Computing Machinery curriculum standards. They also reflect any overlapping changes with the degree in Information Systems.

Proposal XI: Modify the Computer Information Systems BS. The new degree will be called Information Systems BS. This will be a joint major with the Fermanian School of Business and thus needs to meet the standards to be ACBSP accredited along with all other FSB undergraduate degrees. It is also aligned with ACM standards for computing majors with an emphasis in information systems..

Proposal XII: Make minor modifications to the Mathematics BS and BA to reflect the change in computer sciences classes and to fix a typographical error in the number of elective units for the major.

Proposal XIII: Make minor modifications to the Computational Science Minors to reflect the changes in computer science classes.

> 1.   How has assessment data informed the proposed change and how recently has your department or school completed a program review? For example, have alumni, outside reviewers, etc., suggested improvements? (complex and simple proposals)
>
> MICS is scheduled to have its next round of program review begin in the fall of 2016. However two critical things have happened this fall, that have caused us to evaluate our computing related

curriculum:

- The Fermanian School of Business has become interested in partnering with MICS in the development of a joint major in Information Systems. The two departments had previously had a joint major in Management Information Systems, but roughly 10 years ago FSB determined that they were no longer interested in having such a joint major and MICS has been continuing to maintain the major on its own. That major is currently called Computer Information Systems. Because of the nature of the topic, it is fairly common for Information Systems to be a program shared between Computer Science and Business. Proposal XI seeks to modify the Computer Information Systems (CIS) major to conform with the necessary curricular standards for it to fall under the FSB ACBSP accreditation and also to meet Association of Computing Machinery Standards for IS.
- It appears that MICS may experience some transition in our Computer Science faculty and it seemed wise to review the curriculum in light of the most recent national standards from the Association of Computing Machinery (2013) and make the needed curriculum adjustments before contemplating a faculty search. See Proposal XI for the full curriculum.

While we have not done a full program review, these modifications to our programs keep us consistent with national standards. The Information Systems degree change is a response to an increasing desire for more formal business education on the part of our Computer Information Systems majors. In the last couple of years we have had 5-10 students that switch their major back and forth between Business and CIS because they can't find the right mix in either major, in some cases the students seem to be alternating departments each semester. In addition, San Diego is a technology hub and an increasing number of students majoring in Business would like more formal training in computer technology.

Proposal VII indicates the classes that we are removing from our list of course offerings, Proposal VIII indicates the classes that we are adding to our list of course offerings and Proposal IX indicates the courses that we are modifying in our course offerings. Here is a brief description of the reason for each change:

Eliminated classes:
CSC 133 - Introduction to Computer Science and Information Systems (3) (annual) – It is no longer common for an introduction to computer science class to be included in CS curricula. So this class is being eliminated and will be replaced with a class that focuses solely on the introduction to information systems (see ISS123 below).

CSC 354 - Design and Analysis of Algorithms (4) (alternating year) – topics from this class are being incorporated into CSC254 (4) and topics from CSC254 (4) and being shifted to CSC154 (4) and expanded version of CSC153 (3). See below.

CSC 422 - Theory of Computation (2) (alternating year) – this class is often required by students applying to doctoral programs in CS. We have so few students applying to PhD programs in CS that we have eliminated the course and will provide independent study opportunities to students who desire to apply for doctoral programs.

ISS 242 - Visual Programming for Business Applications (2) (alternating year) – this is a useful class for information systems students, but we needed to eliminate it to shape and IS degree within the boundaries of allowable total units.

ISS 424 - Internet Applications Development (4) (alternating year) – this class is being eliminated and ISS414 (see below) is being modified to incorporate topics on applications development with topics in databases. Informal data gathered from students indicated that there was a significant overlap in the material in ISS424 and ISS414 so we are combining these two classes into a single class.

Modified Classes:
CSC 153 (3) to become CSC 154 – Object Oriented Programming (4) (annual) – the topics in this class are being modified to incorporate more information from CSC254 (4). This is part of a domino effect (more information is going into CSC254 so some of the information from CSC254 needs to be added to CSC153).

CSC 254 Data Structures and Algorithm Analysis (4) (annual) – This class is being modified to include additional topics in algorithms analysis and design so that the algorithms analysis course (CSC354) can be removed from the curriculum.

CSC314 Operating Systems (4) annual – topics in this class have been sifted to accommodate changing CS standards and to include more material needed for information systems students.

CSC 324 Software Engineering (4) to be reduced by one unit to CSC 323 Software Engineering (3) (alternating year class) - CSC324 is being reduced by one unit (now it will be called CSC323 Software Engineering (3)) and some of the topics in the class are being moved to ISS342 Project Management and Quality Assurance (2). Expanded emphasis on project management and quality assurance are expectations of both CS and IS standards.

Change CSC 374 Computer Networking and Security (4) to align with Information Systems standards. This is a more hands on and practical approach. The course will be called ISS373 Networking and Security (3) (alternating year).

Change ISS 414 - Data Base Management Systems (4) to more specifically combine data base and information management with some web applications. It will now be called Data Base Systems and Web Integration (4). The material in this new class is a combination of the material in ISS414 Data Base Management Systems and ISS424 Internet Applications Development. Students have told us previously that there was significant overlap between the material in the two courses and this new course will provide integration of the two topics in a single course.

Creation of New Courses:
CSC 252 – Data Structures in C++ (2) (annual, no impact because this is the first half of CSC254) – this is a return to a format that we used previously. This quad class will provide mathematics and information systems students with skills in C++ without requiring them to study the advanced material in algorithm analysis and design that will now be in the second half of CSC254.

ISS 123– Introduction to Information Systems (3) (annual class) – as mentioned above, CS programs no longer have an "introduction" class but IS programs do. So this course is a replacement for CSC133 (3) Introduction to Computer Science and Information Systems. The new course is consistent with IS standards and the change will allow us to add additional topics on enterprise architecture and systems design that is not in CSC133.

ISS 342 – Project Management and Quality Assurance (2) (alternating year) – Current CS and IS standards require a class in project management. As mentioned above, we have removed one unit from Software Engineering (CSC324) to and have moved the management and quality assurance topics to this course.

ISS 493 – Information Systems Project (3) (alternating year) – By including a project, our program can include topic in the IS curriculum standards. The specifics are outlines in the "syllabus" for ISS493 listed below. Fundamentally this project is to ensure that the students have knowledge of enterprise architecture, system design and system integration.

Proposals X and XI indicate the details of the full curriculum in the form of a list that would appear in the catalog for each major once the class offerings have been changed. Note that the total changes proposed slightly reduce the number of units taught by the department. See the full analysis at the end of this proposal.

2.   What are comparable universities and colleges doing? (complex and simple proposals)

The Association of Computing Machinery (ACM) provides the national educational standards for Computer Science and for Information Systems (from the CS point of view). ACBSP provides national standards for Business degrees. In aligning with these standards we are following what many other universities have done.

3.   Is the change related to stipulations imposed by outside accrediting agencies (addressing standards, etc.) or licensure? Or, have these agencies been consulted to assure compliance with standards? (complex proposals)

ACM does not provide accreditation for programs so their standards are meant to be used as guidelines. ACBSP does provide accreditation, so the Information Systems degree must meet ACBSP standards. The Dean of the FSB has sought advice about accreditation issues. It should be noted, that as with all other PLNU business degrees, in order to meet ACBSP standards, non-GE portion of the course work exceeds 59 units (FBS degrees currently range from 61-67 non-GE units).

4.   How does the proposed change relate to the mission of the university? (complex proposals)

The employer demand in San Diego for software engineers and others in the computing professions is very high. The changes in the Computer Science curriculum help us to stay current with the needs of industry. San Diego's business community is increasing based in technology. The change in the Computer Information Systems major provides students who desire to combine computer science and business with a robust major and makes a technology degree more accessible to students who would ordinarily major in business.

5.   How does the change accommodate the department or school's learning outcomes for the major, minor, concentration, etc.? For instance, does the change help balance out the curriculum, or does it fill in a missing gap that would help strengthen the program? Does it add breadth or depth, etc.? (complex and simple proposals)

Computer Science: The curricular changes are modest and consistent with the MICS learning outcomes for the major.

Information Systems: The curricular changes are more significant, but they do not change the computing based learning outcomes for the major. They do expand the knowledge that students will gain in business and since the business basis for the degree is based on the FSB business degree core, it will meet FSB business learning outcomes. Note that in this joint degree we have included the course where MICS assessment occurs (ISS481Senor Seminar) and where FSB assessment occurs (MGT488 Strategic Management).

6.	What impact will it have on the size of the major, minor, etc.? (complex proposals)

Computer Science: The major will stay the same – 59 units excluding GE (see Proposal X)
Information Systems: The major will increase to 62 units excluding GE. The larger size of the major is necessary to meet ACBSP accreditation and the ACM Information Systems standards (see Proposal XI). While this is over the 59 unit limit for typical BS majors, this is consistent with the size of the majors in the Fermanian School of Business (see appended spreadsheet). The closest comparison to this degree is the degree in Accounting in FSB. Accounting has 67 non-GE units of required coursework. This is due to the fact that the students are essentially earning a double degree – one in Accounting and one in Business. The Information Systems degree is built on the same model. The curriculum contains a slightly modified version of the business core (meeting the requirements of ACBSP accreditation) while also containing the technical material necessary for a degree computing. So similar to the accounting major, the students are earning the equivalent of a double degree in Business and in Computing. See the analysis below:

Accounting:
Business Core that is not accounting: 39 (36 without GE)
Accounting Courses: 31
Total: 70 units (**67 without GE**)

Information Systems:
Business Core that is not IS: 37 (31 without GE – note business calculus required)
MICS Courses: 31
Total: 68 units (**62 without GE**)

The increased size of the major does not increase the number of units taught in either the School of Business or the MICS department.

Note that the removal of some theoretical computer science topics may have a negative impact o our ETS scores.

7.	Is there evidence that this change would enhance enrollment or generate new revenue? Please explain. (complex and simple proposals)

The changes in the curriculum may achieve a slight savings (in number of units taught annually) but it will not be significant.

Computer Science: We do not expect these changes to impact enrollment.
Information Systems: This is a degree that is in demand and we believe that the partnership between MICS and FSB will make this particularly attractive to students applying to PLNU who want to work in technology but not as a software engineer.

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8. How does the proposal(s) address the PLNU strategic plan? (complex proposals)

These changes help to keep our degrees "relevant" for students seeking employment in the San Diego area.

9. State other rationale that you deem appropriate. (complex and simple proposals)

N/A

Catalog Copy:

Proposal VIII: In order to update the current Computer Science and Computer Information Systems Degrees (see Proposals X and XI) <u>add</u> the following courses to the Catalog:

        CSC 252 – Data Structures in C++ (2) (annual, no impact because this is the first half of CSC254)
        ISS 123– Introduction to Information Systems (3) (annual class)
        ISS 342 – Project Management and Quality Assurance (2) (alternating year)
        ISS 493 – Information Systems Project (3) (alternating year).

Catalog Copy (Present)	Catalog Copy (New)
	CSC 252 – Data Structures in C++ (2) (annual) Students transition to the C++ language and are introduced to additional data structures, including queues, stacks, trees, and graphs considering their implementation with both arrays and linked lists. Concepts are reinforced through weekly programming assignments. Lecture three hours and laboratory two hours each week (this is a quad class). *Prerequisite(s)*: CSC 153 with a grade of C- or higher NOTE: CSC252 is the first quad of CSC254 **ISS 123– Introduction to Information Systems (3) (annual class)** This course is designed to introduce students to contemporary information systems and demonstrate how these systems are used throughout organizations. The focus of this course will be on the key components of information systems: people, software, hardware, data, and communication technologies, and how these components can be integrated and managed. *Co-requisite:* CSC143 **ISS 342 – Project Management and Quality Assurance (2) (alternating year)** This course discusses the processes, methods, techniques and tools that organizations use to manage their information systems and software development projects. The course covers a systematic methodology for initiating, planning, executing, controlling, and closing projects. It also looks at techniques including unit testing for quality assurance. *Prerequisites: CSC153*

	ISS 493 – Information Systems Project (3) (alternating year)
	This course presents the student with a strong experience in network and systems design. Students will research the key components of enterprise system design. Students, working in teams, investigate, design, implement and present to their classmates a significant information systems project. The project should solve a significant, complex and generalizable problem, dealing with constraints and trade-offs in the solution. Offered 2016-2017. *Prerequisite(s):* CSC 324, ISS343 and Junior or Senior standing.

Tentative Syllabus/Course Learning Outcomes:
If you are proposing new courses, please include a tentative syllabus with course learning outcomes. This should not include textbooks, calendar, etc., but merely an idea of what the course content will include as well as what you hope the student will accomplish by the end of the course. **State at least four course learning outcomes (CLO's).**

CSC252 Data Structures in C++ (2)

Syllabus: Here is a bulleted set of topics that will be covered in the course:
- Syntax differences between Java and C++
- Advanced Object Oriented Concepts (inheritance, and polymorphism) in C++
- Definition, implementation, and applications of the basic data structures and associated operators including static and dynamic arrays, stacks, queues, and vectors.
- Abstract Data Types (ADT) and their purpose
- Dynamic memory allocation
- Pointers and linked lists in C++
- C++ standard I/O classes
- The use of Visual Studio.net

Outcomes: Here are the course learning outcomes:
- Students will be able to write correct and robust software.
- Students will use the theory of algorithms and computation to solve problems.
- Students will analyze the interaction between hardware and software.
- Students will be able to apply their technical knowledge to solve problems.
- Students will be able to speak about their work with precision, clarity and organization.
- Students will be able to write about their work with precision, clarity and organization.
- Students will collaborate effectively in teams.
- Students will be able to gather relevant information, examine information and form a conclusion based on that information.
- Students will be able to understand and create arguments supported by quantitative evidence, and they can clearly communicate those arguments in a variety of formats

ISS 123– Introduction to Information Systems (3) (annual class)

Syllabus: Here is a bulleted set of topics that will be covered in the course:
- Information systems components and infrastructure
- How information systems are used in organizations
- The use of tools for decision making (dashboards, visualization, etc.)
- Security of information systems
- Enterprise-wide information systems
- Design and acquisition of information systems
- Information systems ethics and crime

Outcomes: Here are the course learning outcomes:
Department Outcomes:
- Students will be able to apply their technical knowledge to solve problems.
- Students will use information management as a tool to support decision making in business environments.

Course Outcomes:
Students will be able to:
- Describe how and why information systems are used today
- Explain the technology, people, and organizational components of information
- Describe how businesses are using information systems for competitive advantage
- Explain the major components of an information systems infrastructure, including enterprise systems
- Understand how various types of information systems provide the information needed to gain business intelligence to support the decision making for the different levels and functions of the organization.
- Evaluate the ethical concerns that information systems raise in society and the impact of information systems on crime, terrorism, and war.

ISS 342 – Project Management and Quality Assurance (2) (alternating year)

Syllabus: Here is a bulleted set of topics that will be covered in the course:

- Introduction to Project Management
- The Project Management Lifecycle
- Managing Project Teams
- Managing Project Communication
- Project Initiation and Planning
- Managing Project Scope
- Managing Project Scheduling
- Managing Project Resources
- Managing Project Quality
- Project Execution, Control & Closure

Outcomes: Here are the course learning outcomes:

Department Outcomes:
Students will be able to:
- Apply their technical knowledge to solve problems.
- Use information management as a tool to support decision making in business environments
- Analyze the interaction between hardware and software.
- Speak about their work with precision, clarity and organization (Oral Communication).
- Write about their work with precision, clarity and organization (Written Communication).
- Collaborate effectively in teams.

Course Outcomes:
Students will be able to:
- Create a timeline for a project that includes the full project lifecycle.
- Design a system for tracking project progress of the project and to allocate resources.
- Use techniques and tests to assure the quality of the final product produced by the project.

ISS 493 – Information Systems Project (3) (alternating)

Syllabus: Here is a bulleted set of topics that will be covered in the course:

This is a project based course and students will be given an IT problem (infrastructure, data management or integration) asked to design a solution. Topics covered:
- Important features in system design (enterprise and smaller scale)
- Analysis of business requirements
- Project specification
- Analysis of project feasibility
- Analysis and specification of system requirements
- Implementation of information systems to support business requirements
- System design
- Project management plan and timeline

Outcomes: Here are the course learning outcomes:

Department Outcomes:
Students will be able to:
- Analyze the interaction between hardware and software.
- Use information management as a tool to support decision making in business environments.
- Apply their technical knowledge to solve problems.
- Speak about their work with precision, clarity and organization (Oral Communication).
- Write about their work with precision, clarity and organization (Written Communication).
- Collaborate effectively in teams.
- Identify, locate, evaluate, and effectively and responsibly use and cite information for the task at hand (Information Literacy).

Department Outcomes:
Students will be able to:
- Identify the key issues to be considered when designing an IT solution to a problem.
- Design an IT solution.
- Estimate the cost and time required to implement the solution.

Catalog Copy:
Proposal IX: In order to update the current Computer Science and Computer Information Systems Degrees (see Proposals X and XI) <u>modify</u> the following courses in the Catalog:

> **CSC 153 (3) to become CSC 154 – Object Oriented Programming (4) (annual)**
> **CSC 254 Data Structures and Algorithm Analysis (4) (annual)**
> **CSC314 Operating Systems (4) annual**
> **CSC 324 Software Engineering (4) to be reduced by one unit to CSC 323 Software Engineering (3) (alternating year class).**
> **Change CSC 374 Computer Networking and Security (4) to align with Information Systems standards. This is a more hands on and practical approach. The course will be called ISS373 Networking and Security (3) (alternating year).**
> **Change ISS 414 - Data Base Management Systems (4) to more specifically combine data base and information management with some web applications. It will now be called Data Base Systems and Web Integration (4).**

Catalog Copy (Present)	Catalog Copy (New)
CSC 153 - Fundamentals of Computer Science (3) As a continuation of CSC 143, this course deals with more advanced computing constructs and ideas. Topics include multi-dimensional arrays, inheritance, polymorphism, exception handling and recursion. More advanced graphics and GUIs are discussed and implemented as well. Problem solving strategies are discussed, and in addition to the weekly lab projects, the student will complete a fairly sophisticated game-based project. Lecture two hours and laboratory four hours each week. *Prerequisite(s):* CSC 143 with a grade of C- or higher.	**CSC 154 – Object-Oriented Programming (4)** As a continuation of CSC 143, this course introduces more advanced computing constructs and ideas reinforced in weekly labs. Topics include object-oriented design, inheritance, polymorphism, exception handling, simple ADTs, and recursion, along with more intentional development and debugging strategies. Students gain experience in the design of graphical user interfaces and event driven programming culminating with the creation of a multi-week game-based project. Lecture three hours and laboratory two hours each week. *Prerequisite(s):* CSC 143 with a grade of C- or higher.
CSC 254 - Data Structures and Algorithms (4) Standard data structures, including queues, stacks, trees, and graphs, as objects are defined and illustrated with associated dynamic storage management mechanisms; computational complexity is explored through the design and analysis of searching, sorting, and graph algorithms. Lecture three hours and laboratory two hours each week. *Prerequisite(s):* CSC 153 with a grade of C- or higher.	**CSC 254 - Data Structures and Algorithms (4)** Standard data structures, including queues, stacks, trees, and graphs, as objects are defined and illustrated with associated dynamic storage management mechanisms. Introduces formal techniques to support the design and analysis of algorithms, focusing on both the underlying mathematical theory and practical considerations of efficiency. Topics include measuring the complexity of recursive and iterative algorithms, algorithmic strategies, the concept of intractability and the theory of NP. Emphasis is placed on non-numerical algorithms such as sorting, searching, graph and network algorithms both sequential and parallel. Concepts are reinforced through weekly programming assignments. Lecture three hours and laboratory two hours each week. *Prerequisite(s)*: CSC 154 with a grade of C- or higher.

CSC 314 Operating Systems (4) A course in systems software that is largely concerned with operating systems. Such topics as process management, device management, and memory management are discussed, as are relevant issues associated with security and protection. Computer hardware concepts related to operating systems are also covered in the context of both single and multi-core processors. Students will complete assignments using both the Windows and Linux platforms. *Prerequisite*: CSC254	**CSC314 Operating Systems (4)** A systems course focusing on operating systems, topics include basic operating system design, process management, device management, memory management, and file systems. Students are introduced to the basics of software evolution, reliability, concurrency, security and protection in the context of single-core, multi-core, distributed, and virtual environments. Class members gain experience using both GUI and command-line interfaces. In the course of implementing a CPU scheduling simulation, students understand the importance of thorough system testing and attention to system specs as they try to make parts of their systems work with those designed by their teammates. *Prerequisite*: CSC254
CSC 324 - Software Engineering (4) This course offers an in-depth treatment of the software development process. Software analysis and design study emphasizes an object-oriented approach that is introduced and contrasted with traditional design methodologies. CASE tools are used during the design process. Lecture three hours and laboratory two hours each week. 2016-2017. *Corequisite(s):* CSC 254.	**CSC 323 - Software Engineering (3)** This course offers an in-depth treatment of the software development process. Software analysis and design study emphasizes an object-oriented approach that is introduced and contrasted with traditional design methodologies. CASE tools are used during the design process. Lecture two hours and laboratory two hours each week. 2016-2017. *Corequisite(s):* CSC 254.
CSC 374 - Computer Networking and Security (4) This course provides an introduction to modern computer network technologies. Students gain an understanding of networking fundamentals including layering and the OSI model, protocols, standards, and network services. LANS, MANS, WANS, Internet and wireless networks are covered. While theory is the focus of the class, some hands-on activities are included. Offered 2015-2016. *Prerequisite(s):* CSC 153 and Junior standing.	**ISS 373 - Networking and Security (3)** This course provides an introduction to modern computer network technologies. Students gain an understanding of networking fundamentals including layering and the OSI model, protocols, standards, and network services. LANS, MANS, WANS, Internet and wireless networks are covered. The class will also cover the basics of network security. The class includes ~~While theory is the focus of the class, some~~ hands-on activities ~~are included~~. Offered 2015-2016. *Prerequisite(s):* CSC 154 and Junior standing.

ISS 414 - Data Base Management Systems (4)	ISS 414 - Data Base Systems and Web Integration (4)
An introduction to database management systems covering data models (including relational, network, hierarchical, and object oriented), relational databases, query languages, relational database design, transaction processing, distributed databases, and physical database design. Students will see examples from both business and science. They will become familiar with analysis tools associated with scientific databases (including BLAST) and gain experience accessing databases using Python scripts and web-based gateways. Offered 2015-2016. Alternating year class. *Prerequisite(s):* CSC 153.	An introduction to database management systems covering data models (including relational, network, hierarchical, and object oriented), relational databases, query languages, relational database design, transaction processing, distributed databases, and physical database design. Students will see examples from both business and science. They will become familiar with analysis tools ~~associated with scientific databases (including BLAST)~~ and gain experience accessing databases using Python scripts and web-based gateways. Students will also design web interfaces for data bases. Offered 2015-2016. Alternating year class. *Prerequisite(s):* CSC 154.

Proposal X: Make small modifications to the following majors: Computer Science: BS, Computer Science: Software Engineering BS, Computer Science BA. These are changes that bring our curriculum into alignment with the most recent set of Association of Computing Machinery curriculum standards. They also reflect any overlapping changes with the degree in Information Systems.

Program Name and introductory text if any:

All three of the following are shown below:
- Computer Science: Technical Applications BS
- Computer Science: Software Engineering BS
- Computer Science: Software Engineering BA

Program Learning Outcomes (majors only):

Note that these are the current program learning outcomes for Computer Science BS, Computer Science: Software Engineering BS and Computer Science BA and they will remain the same for the updated degrees:

Students who complete the program will be able to:
1. Write correct and robust software.
2. Use the theory of algorithms and computation to solve problems.
3. Analyze the interaction between hardware and software.
4. Apply their technical knowledge to solve problems.
5. Speak about their work with precision, clarity and organization (Oral Communication).
6. Write about their work with precision, clarity and organization (Written Communication).
7. Collaborate effectively in teams.
8. Students will be able to identify, locate, evaluate, and effectively and responsibly use and cite information for the task at hand (Information Literacy).
9. Students will be able to gather relevant information, examine information and form a conclusion based on that information (Critical Thinking).
10. Students will be able to understand and create arguments supported by quantitative evidence, and they can clearly communicate those arguments in a variety of formats (Quantitative Reasoning).
11. Graduates will be prepared for:
    a. Careers that use computer science in business, industry, government and the non-profit sector; and
    b. Graduate study in fields related to computer science.

Existing Computer Science BS	Proposed Computer Science: Technical Applications BS
Lower-Division Requirements: CSC 133 - Introduction to Computer Science and Information Systems (3) CSC 143 - Introduction to Computer Programming (3) CSC 153 - Fundamentals of Computer Science (3) CSC 254 - Data Structures and Algorithms (4) MTH 164 - Calculus I (GE) (4) MTH 174 - Calculus II (4) Total: 21 Units	Lower-Division Requirements: CSC 133 - Introduction to Computer Science and Information Systems (3) CSC 143 - Introduction to Computer Programming (3) CSC 154 - Object-Oriented Programming (4) CSC 254 - Data Structures and Algorithms (4) MTH 164 - Calculus I (GE) (4) MTH 174 - Calculus II (4) MTH233 – Linear Algebra (3) MTH 203 – Introduction to Statistics (3)* PHL 211 – Ethics (GE) (3) **Total Lower Division Units: 28 (22 units other than GE)** * MTH382 – Mathematical Statistics (2) may substitute for this class.
Upper-Division Requirements: CSC 314 - Operating Systems (4) CSC 324 - Software Engineering (4) CSC 354 - Design and Analysis of Algorithms (4) CSC 374 - Computer Networking and Security (4) CSC 394 - Programming Languages (4) CSC 412 - Topics in Computer Science (2) CSC 422 - Theory of Computation (2) CSC 454 - Computer Architecture and Assembly Language (4) CSC 481 - Senior Seminar in Computer Science (1) CSC 493 - Software Project (3) MTH 343 - Discrete Mathematics (3)	Upper-Division Requirements: CSC 314 - Operating Systems (4) CSC 323 - Software Engineering (3) CSC 354 - Design and Analysis of Algorithms (4) ISS 373 – Computer Networking and Security (3) CSC 394 - Programming Languages (4) CSC 412 - Topics in Computer Science (2) CSC 422 - Theory of Computation (2) CSC 454 - Computer Architecture and Assembly Language (4) CSC 481 - Senior Seminar in Computer Science (1) CSC 493 - Software Project (3) ISS 414 - Data Base Systems and Web Integration (4) MTH 343 - Discrete Mathematics (3)

Choose one sequence from:	Choose one sequence from:
CSC 496 - Service Learning in Computer Science I (2) AND	CSC 496 - Service Learning in Computer Science I (2) AND
CSC 497 - Service Learning in Computer Science II (1)	CSC 497 - Service Learning in Computer Science II (1)
CSC 498 - Independent Research in Computer Science I (2) AND	CSC 498 - Independent Research in Computer Science I (2) AND
CSC 499 - Independent Research in Computer Science II (1)	CSC 499 - Independent Research in Computer Science II (1)
ISS 472 - Internship in Computer Information Systems (3)	ISS 472 - Internship in Computer Information Systems (2)
HON 498 - Honors Project I (2) AND	HON 498 - Honors Project I (2) AND
HON 499 - Honors Project II (1)	HON 499 - Honors Project II (1)
	Total Upper Division Units: 31-32
4-5 additional units chosen from:	5-6 additional units chosen from:
CSC 302 - Unix and Python Scripting for Computational Science (2)	CSC 302 - Unix and Python Scripting for Computational Science (2)
CSC 311 - R for Computational Science (1)	CSC 311 - R for Computational Science (1)
CSC 412 - Topics in Computer Science (2)	CSC 412 - Topics in Computer Science (2)
CSC 491 - Independent Studies in Computer Science (1-4)	CSC 491 - Independent Studies in Computer Science (1-4)
CSC 496 - Service Learning in Computer Science I (2)	CSC 496 - Service Learning in Computer Science I (2)
CSC 497 - Service Learning in Computer Science II (1)	CSC 497 - Service Learning in Computer Science II (1)
CSC 498 - Independent Research in Computer Science I (2)	CSC 498 - Independent Research in Computer Science I (2)
CSC 499 - Independent Research in Computer Science II (1)	CSC 499 - Independent Research in Computer Science II (1)
ISS 242 - Visual Programming for Business Applications (2)	ISS 242 - Visual Programming for Business Applications (2)
ISS 414 - Data Base Management Systems (4)	ISS 414 - Data Base Management Systems (4)
ISS 424 - Internet Applications Development (4)	ISS 424 - Internet Applications Development (4)
ISS 472 - Internship in Computer Information Systems (2)	ISS 342 – Project Management and Quality Assurance (2)
MTH 203 - Introduction to Statistics (3) *	ISS 472 - Internship in Computer Information Systems (2)
MTH 233 - Linear Algebra (3)	MTH 203 - Introduction to Statistics (3) *
MTH 274 - Calculus III (4)	MTH 233 - Linear Algebra (3)
MTH 373 - Mathematical Modeling (3)	MTH 274 - Calculus III (4)
MTH 382 - Mathematical Statistics (2) *	MTH 373 - Mathematical Modeling (3)
MTH 392 - Mathematical Probability (2)	MTH 382 - Mathematical Statistics (2) *
HON 498 - Honors Project I (2)	MTH 392 - Mathematical Probability (2)
HON 499 - Honors Project II (1)	HON 498 - Honors Project I (2)
	HON 499 - Honors Project II (1)
	Total Elective Units: 5-6 (6 if ISS472 selected above in choose one)
59 Units Without GE	**59 Units Without GE**

Existing Computer Science: Software Engineering BS	Proposed Computer Science: Software Engineering BS
Lower Division Requirements: CSC 133 - Introduction to Computer Science and Information Systems (3) CSC 143 - Introduction to Computer Programming (3) CSC 153 - Fundamentals of Computer Science (3) CSC 254 - Data Structures and Algorithms (4) MTH 164 - Calculus I (GE) (4) MTH 174 - Calculus II (4) Total: 21 units	Lower-Division Requirements: CSC 133 - Introduction to Computer Science and Information Systems (3) CSC 143 - Introduction to Computer Programming (3) CSC 154 - Object-Oriented Programming (4) CSC 254 - Data Structures and Algorithms (4) MTH 164 - Calculus I (GE) (4) MTH 174 - Calculus II (4) MTH 203 – Introduction to Statistics (3)* PHL 211 – Ethics (GE) (3) **Total Lower Division Units: 25 (19 units other than GE)** * MTH382 – Mathematical Statistics (2) may substitute for this class.
Upper Division Requirements: CSC 314 - Operating Systems (4) CSC 324 - Software Engineering (4) CSC 354 - Design and Analysis of Algorithms (4) CSC 374 - Computer Networking and Security (4) CSC 394 - Programming Languages (4) CSC 412 - Topics in Computer Science (2) CSC 422 - Theory of Computation (2) CSC 454 - Computer Architecture and Assembly Language (4) CSC 481 - Senior Seminar in Computer Science (1) CSC 493 - Software Project (3) MTH 343 - Discrete Mathematics (3)	Upper-Division Requirements: CSC 314 - Operating Systems (4) CSC 323 - Software Engineering (3) CSC 354 - Design and Analysis of Algorithms (4) CSC 374 - Computer Networking and Security (4) CSC 394 - Programming Languages (4) CSC 412 - Topics in Computer Science (2) CSC 422 - Theory of Computation (2) CSC 454 - Computer Architecture and Assembly Language (4) CSC 481 - Senior Seminar in Computer Science (1) CSC 493 - Software Project (3) ISS 342 – Project Management and Quality Assurance (2) ISS 414 - Data Base Systems and Web Integration (4) MTH 343 - Discrete Mathematics (3) BUS 313 – Administrative Communication (3)

Choose one sequence from: CSC 496 - Service Learning in Computer Science I (2) AND CSC 497 - Service Learning in Computer Science II (1) CSC 498 - Independent Research in Computer Science I (2) AND CSC 499 - Independent Research in Computer Science II (1) HON 498 - Honors Project I (2) AND HON 499 - Honors Project II (1)	Choose one sequence from: CSC 496 - Service Learning in Computer Science I (2) AND CSC 497 - Service Learning in Computer Science II (1) CSC 498 - Independent Research in Computer Science I (2) AND CSC 499 - Independent Research in Computer Science II (1) HON 498 - Honors Project I (2) AND HON 499 - Honors Project II (1) **Total Upper Division Units: 34**
4 additional units chosen from: CSC 496 - Service Learning in Computer Science I (2) CSC 497 - Service Learning in Computer Science II (1) ISS 242 - Visual Programming for Business Applications (2) ISS 414 - Data Base Management Systems (4) ISS 472 - Internship in Computer Information Systems (2)	6 additional units chosen from: CSC 302 – Unix and Python Scripting for Computational Science (2) CSC 311 - R for Computational Science (1) CSC 412 - Topics in Computer Science (2) CSC 496 - Service Learning in Computer Science I (2) CSC 497 - Service Learning in Computer Science II (1) ISS 373 – Computer Networking and Security (3) ~~ISS 242 - Visual Programming for Business Applications (2)~~ ~~ISS 414 - Data Base Management Systems (4)~~ ISS 472 - Internship in Computer Information Systems (2) **Total Elective Units: 6**
59 units without GE	**59 units without GE**

Existing Computer Science BA	Proposed Computer Science: Software Engineering BA
Lower-Division Requirements:	Lower-Division Requirements:
CSC 133 - Introduction to Computer Science and Information Systems (3)	CSC 133 - Introduction to Computer Science and Information Systems (3)
CSC 143 - Introduction to Computer Programming (3)	CSC 143 - Introduction to Computer Programming (3)
CSC 153 - Fundamentals of Computer Science (3)	CSC 154 - Object-Oriented Programming (4)
CSC 254 - Data Structures and Algorithms (4)	CSC 254 - Data Structures and Algorithms (4)
MTH 164 - Calculus I (GE) (4) *	MTH 164 - Calculus I (GE) (4)*
	MTH 203 – Introduction to Statistics (3)**
	PHL 211 – Ethics (GE) (3)
Total: 17 Units	
	Total Lower Division Units: 21 (14 non-GE units)
Note(s):	* MTH144 may substitute for MTH164
* MTH 144 may substitute for MTH 164	** MTH382 – Mathematical Statistics (2) may substitute for this class.
Upper-Division Requirements:	Upper-Division Requirements:
CSC 314 - Operating Systems (4)	CSC 314 - Operating Systems (4)
CSC 324 - Software Engineering (4)	CSC 323 - Software Engineering (3)
CSC 354 - Design and Analysis of Algorithms (4)	CSC 354 - Design and Analysis of Algorithms (4)
CSC 394 - Programming Languages (4)	CSC 394 - Programming Languages (4)
CSC 454 - Computer Architecture and Assembly Language (4)	CSC 454 - Computer Architecture and Assembly Language (4)
CSC 481 - Senior Seminar in Computer Science (1)	CSC 481 - Senior Seminar in Computer Science (1)
MTH 343 - Discrete Mathematics (3)	ISS 342 – Project Management and Quality Assurance (2)
	ISS 414 - Data Base Systems and Web Integration (4)
	MTH 343 - Discrete Mathematics (3)
	BUS 313 – Administrative Communication (3)
Choose one sequence from:	Choose one sequence from:
CSC 496 - Service Learning in Computer Science I (2) AND	CSC 496 - Service Learning in Computer Science I (2) AND
CSC 497 - Service Learning in Computer Science II (1)	CSC 497 - Service Learning in Computer Science II (1)
CSC 498 - Independent Research in Computer Science I (2) AND	CSC 498 - Independent Research in Computer Science I (2) AND
CSC 499 - Independent Research in Computer Science II (1)	CSC 499 - Independent Research in Computer Science II (1)
ISS 472 - Internship in Computer Information Systems (2)	ISS 472 - Internship in Computer Information Systems (2)
HON 498 - Honors Project I (2) AND	HON 498 - Honors Project I (2) AND
HON 499 - Honors Project II (1)	HON 499 - Honors Project II (1)
	Total Upper Division Units: 30-31

3-4 additional units chosen from:	4-5 additional units chosen from:
CSC 302 - Unix and Python Scripting for Computational Science (2)	CSC 302 - Unix and Python Scripting for Computational Science (2)
CSC 311 - R for Computational Science (1)	CSC 311 - R for Computational Science (1)
CSC 374 - Computer Networking and Security (4)	~~CSC 374 - Computer Networking and Security (4)~~
CSC 412 - Topics in Computer Science (2)	CSC 412 - Topics in Computer Science (2)
CSC 422 - Theory of Computation (2)	~~CSC 422 - Theory of Computation (2)~~
CSC 491 - Independent Studies in Computer Science (1-4)	CSC 491 - Independent Studies in Computer Science (1-4)
CSC 493 - Software Project (3)	CSC 493 - Software Project (3)
CSC 496 - Service Learning in Computer Science I (2)	CSC 496 - Service Learning in Computer Science I (2)
CSC 497 - Service Learning in Computer Science II (1)	CSC 497 - Service Learning in Computer Science II (1)
CSC 498 - Independent Research in Computer Science I (2)	CSC 498 - Independent Research in Computer Science I (2)
CSC 499 - Independent Research in Computer Science II (1)	CSC 499 - Independent Research in Computer Science II (1)
ISS 242 - Visual Programming for Business Applications (2)	~~ISS 242 - Visual Programming for Business Applications (2)~~
ISS 414 - Data Base Management Systems (4)	~~ISS 414 - Data Base Management Systems (4)~~
ISS 424 - Internet Applications Development (4)	~~ISS 424 - Internet Applications Development (4)~~
ISS 472 - Internship in Computer Information Systems (2)	ISS 373 – Computer Networking and Security (3)
MTH 174 - Calculus II (4)	ISS 472 - Internship in Computer Information Systems (2)
MTH 203 - Introduction to Statistics (3) *	MTH 174 - Calculus II (4)
MTH 233 - Linear Algebra (3)	~~MTH 203 - Introduction to Statistics (3) *~~
MTH 274 - Calculus III (4)	MTH 233 - Linear Algebra (3)
MTH 373 - Mathematical Modeling (3)	MTH 274 - Calculus III (4)
MTH 382 - Mathematical Statistics (2) *	MTH 373 - Mathematical Modeling (3)
MTH 392 - Mathematical Probability (2)	~~MTH 382 - Mathematical Statistics (2) *~~
HON 498 - Honors Project I (2)	MTH 392 - Mathematical Probability (2)
HON 499 - Honors Project II (1)	HON 498 - Honors Project I (2)
	HON 499 - Honors Project II (1)
	Total Elective Units: 4-5
49 units without GE	**49 units without GE**
	Please note that while this list is long, it is reusing required courses from other programs in the department.

Proposal XI: Modify the Computer Information Systems BS. The new degree will be called Information Systems BS. This will be a joint major with the Fermanian School of Business and thus needs to meet the standards to be ACBSP accredited along with all other FSB undergraduate degrees. It is also aligned with ACM standards for computing majors with an emphasis in information systems.

Program Name and introductory text if any:

Information Systems

Program Learning Outcomes (majors only):
To maintain alignment with both MICS and FSB assessment programs and learning outcomes, this program currently makes use of existing learning outcomes from both departments. FSB is currently revising their learning outcomes and we will adjust the learning outcomes as appropriate before the catalog for 2015-16 is completed.

PLO's from MICS for computer science part of the degree:

Students who complete the program will be able to:
1. Write correct and robust software.
2. Analyze the interaction between hardware and software.
3. Use information management as a tool to support decision making in business environments.
4. Apply their technical knowledge to solve problems.
5. Speak about their work with precision, clarity and organization (Oral Communication).
6. Write about their work with precision, clarity and organization (Written Communication).
7. Collaborate effectively in teams.
8. Students will be able to identify, locate, evaluate, and effectively and responsibly use and cite information for the task at hand (Information Literacy).
9. Students will be able to gather relevant information, examine information and form a conclusion based on that information (Critical Thinking).
10. Students will be able to understand and create arguments supported by quantitative evidence, and they can clearly communicate those arguments in a variety of formats (Quantitative Reasoning).
11. Graduates will be prepared for:
    a. Careers that use computer information systems in business, industry, government and the non-profit sector; and
    b. Graduate study in fields related to computer information systems.

PLO's from FSB for business part of the degree

Students who complete the program will be able to:
1. Identify and understand definitions and terms in business.
2. Demonstrate an understanding of the framework of concepts within business.
3. Compare multiple perspectives in business.
4. Evaluate and appropriately apply the concepts of business.
5. Solve problems in business by using the knowledge they have.
6. Communicate, in various mediums, the essentials of business.
7. Develop a professional presentation in their work in business.
8. Articulate the integration of their faith into business.
9. Demonstrate ethical behavior in work and life interactions.
10. Demonstrate citizenship by consistently meeting obligations in business.

Current Computer Information Systems Curriculum	Proposed Information Systems Curriculum
Lower-Division Requirements: ISS 242 - Visual Programming for Business Applications (2) CSC 133 - Introduction to Computer Science and Information Systems (3) CSC 143 - Introduction to Computer Programming (3) CSC 153 - Fundamentals of Computer Science (3) CSC 254 - Data Structures and Algorithms (4) MTH 164 - Calculus I (GE) (4) * MTH 203 - Introduction to Statistics (3) MGT 212 - Principles of Management (3) ECO 102 - Principles of Microeconomics (GE) (3) (Microeconomics) Total: 29 Units Note(s): * MTH 144 may substitute for MTH 164	Lower-Division Requirements: ~~ISS 242 - Visual Programming for Business Applications (2)~~ ~~CSC 133 - Introduction to Computer Science and Information Systems (3)~~ ISS 123– Introduction to Information Systems (3) CSC 143 - Introduction to Computer Programming (3) CSC 154 - Object-Oriented Programming (4) ~~CSC 254 - Data Structures and Algorithms (4)~~ CSC 252 Data Structures in C++(2) ~~MTH 164 - Calculus I (GE) (4) *~~ MTH 173 Business Calculus (GE) (3) * MTH 203 - Introduction to Statistics (3) MGT 212 - Principles of Management (3) ~~ECO 102 - Principles of Microeconomics (GE) (3) (Microeconomics)~~ ECO 100 Survey of Economics (GE) (3)** ACC 201 - Principles of Financial Accounting (4) ACC 202 - Principles of Managerial Accounting (3) BUS 201 - Legal Environment of Business (3) **Total Lower Division: 34 units (28 non-GE units)** Note(s):* MTH 144 or MTH164 may substitute for MTH 173 ** ECO101 and ECO102 may substitute for ECO100
Upper-Division Requirements: ISS 324 - Software Engineering (4) ISS 414 - Data Base Management Systems (4) ISS 424 - Internet Applications Development (4) ISS 481 - Senior Seminar in Computer Information Systems (1) CSC 314 - Operating Systems (4) CSC 374 - Computer Networking and Security (4)	Upper-Division Requirements: ~~ISS 324 - Software Engineering (4)~~ ISS 414 - Data Base Systems and Web Integration (4) ~~ISS 424 - Internet Applications Development (4)~~ ISS 481 - Senior Seminar in Computer Information Systems (1) CSC 314 - Operating Systems (4) ~~CSC~~ ISS 373 - ~~Computer~~ Networking and Security (3) ISS 493 – Information Systems Project (3) ISS342 Project Management and Quality Assurance (2) ISS 472 - Internship in Computer Information Systems (2) – now required BUS 313 – Administrative Communication (3) MKT 332 – Principles Marketing (3) FIN 335- Business Finance (3) BUS 480- International Business (3) MGT 488 - Strategic Management (3) **Total Upper Division Units: 34** **Total Units: 68 units (62 non-GE units)**

Choose one sequence from: ISS 472 - Internship in Computer Information Systems (2) ISS 496 - Service Learning in Computer Information Systems I (2) AND ISS 497 - Service Learning in Computer Information Systems II (1) ISS 498 - Independent Research in Computer Information Systems I (2) AND ISS 499 - Independent Research in Computer Information Systems II (1) HON 498 - Honors Project I (2) AND HON 499 - Honors Project II (1) 5-6 additional units chosen from: ISS 472 - Internship in Computer Information Systems (2) ISS 496 - Service Learning in Computer Information Systems I (2) ISS 497 - Service Learning in Computer Information Systems II (1) ISS 498 - Independent Research in Computer Information Systems I (2) ISS 499 - Independent Research in Computer Information Systems II (1) CSC 412 - Topics in Computer Science (2) CSC 493 - Software Project (3) ACC 201 - Principles of Financial Accounting (4) BUS 201 - Legal Environment of Business (3) BUS 313 - Administrative Communication (3) MKT 332 - Principles of Marketing (3) MGT 374 - Human Resource Management (3) HON 498 - Honors Project I (2) HON 499 - Honors Project II (1)	Choose one sequence from: ISS 472 - Internship in Computer Information Systems (2) ISS 496 - Service Learning in Computer Information Systems I (2) AND ISS 497 - Service Learning in Computer Information Systems II (1) ISS 498 - Independent Research in Computer Information Systems I (2) AND ISS 499 - Independent Research in Computer Information Systems II (1) HON 498 - Honors Project I (2) AND HON 499 - Honors Project II (1) 5-6 additional units chosen from: ISS 472 - Internship in Computer Information Systems (2) ISS 496 - Service Learning in Computer Information Systems I (2) ISS 497 - Service Learning in Computer Information Systems II (1) ISS 498 - Independent Research in Computer Information Systems I (2) ISS 499 - Independent Research in Computer Information Systems II (1) CSC 412 - Topics in Computer Science (2) CSC 493 - Software Project (3) ACC 201 - Principles of Financial Accounting (4) BUS 201 - Legal Environment of Business (3) BUS 313 - Administrative Communication (3) MKT 332 - Principles of Marketing (3) MGT 374 - Human Resource Management (3) HON 498 - Honors Project I (2) HON 499 - Honors Project II (1) Recommended class: CSC324 Software Engineering (3)

Proposal XII: Make minor modifications to the Mathematics BS and BA to reflect the change in computer science classes and to fix a typographical error in the number of elective units for the major.

See the next page for the side by side comparison.

Existing Mathematics BS	Proposed Changes Mathematics BS
Existing Mathematics BS	**Proposed Changes Mathematics BS**
Lower-Division Requirements	Lower-Division Requirements
MTH 164 - Calculus I (GE) (4)	MTH 164 - Calculus I (GE) (4)
MTH 174 - Calculus II (4)	MTH 174 - Calculus II (4)
MTH 233 - Linear Algebra (3)	MTH 233 - Linear Algebra (3)
MTH 242 - Number Theory with Proofs (2)	MTH 242 - Number Theory with Proofs (2)
MTH 274 - Calculus III (4)	MTH 274 - Calculus III (4)
CSC 143 - Introduction to Computer Programming (3)	CSC 143 - Introduction to Computer Programming (3)
CSC 153 - Fundamentals of Computer Science (3)	CSC 154 – Object Oriented Programming (4)
CSC 254 - Data Structures and Algorithms (4)	CSC 252 - Data Structures in C++ (2)
PHY 241 - University Physics I (GE) (4)	PHY 241 - University Physics I (GE) (4)
Total: 31 Units (23 non-GE units)	**Total: 30 Units (22 non-GE units)**
Upper-Division Requirements	Upper-Division Requirements
MTH 333 - Differential Equations (3)	MTH 333 - Differential Equations (3)
MTH 352 - History of Mathematics (2)	MTH 352 - History of Mathematics (2)
MTH 382 - Mathematical Statistics (2)	MTH 382 - Mathematical Statistics (2)
MTH 424 - Real Analysis (4)	MTH 424 - Real Analysis (4)
MTH 444 - Abstract Algebra (4)	MTH 444 - Abstract Algebra (4)
MTH 481 - Senior Seminar in Mathematics (1)	MTH 481 - Senior Seminar in Mathematics (1)
MTH 492 - Special Topics in Mathematics (2)	MTH 492 - Special Topics in Mathematics (2)
Choose two courses from:	Choose two courses from:
MTH 343 - Discrete Mathematics (3)	MTH 343 - Discrete Mathematics (3)
MTH 373 - Mathematical Modeling (3)	MTH 373 - Mathematical Modeling (3)
MTH 413 - Complex Analysis (3)	MTH 413 - Complex Analysis (3)
Choose one sequence from:	Choose one sequence from:
MTH 496 - Service Learning in Mathematics I (2) AND	MTH 496 - Service Learning in Mathematics I (2) AND
MTH 497 - Service Learning in Mathematics II (1)	MTH 497 - Service Learning in Mathematics II (1)
MTH 498 - Independent Research in Mathematics I (2) AND	MTH 498 - Independent Research in Mathematics I (2) AND
MTH 499 - Independent Research in Mathematics II (1)	MTH 499 - Independent Research in Mathematics II (1)
HON 498 - Honors Project I (2) AND	HON 498 - Honors Project I (2) AND
HON 499 - Honors Project II (1)	HON 499 - Honors Project II (1)
Total: 27 Units	**Total: 27 Units**

<u>Five</u> additional elective units from:	<u>Eight</u> additional elective units from:
MTH 343 - Discrete Mathematics (3)	MTH 343 - Discrete Mathematics (3)
MTH 373 - Mathematical Modeling (3)	MTH 373 - Mathematical Modeling (3)
MTH 392 - Mathematical Probability (2)	MTH 392 - Mathematical Probability (2)
MTH 402 - Topics in Geometry (2)	MTH 402 - Topics in Geometry (2)
MTH 413 - Complex Analysis (3)	MTH 413 - Complex Analysis (3)
MTH 463 - Secondary School Mathematics (3)	~~MTH 463 - Secondary School Mathematics (3)~~
MTH 471 - History of Mathematics Study Tour (1)	MTH 471 - History of Mathematics Study Tour (1)
MTH 491 - Independent Study in Mathematics (1-4)	MTH 491 - Independent Study in Mathematics (1-4)
MTH 492 - Special Topics in Mathematics (2)	MTH 492 - Special Topics in Mathematics (2)
MTH 496 - Service Learning in Mathematics I (2)	MTH 496 - Service Learning in Mathematics I (2)
MTH 497 - Service Learning in Mathematics II (1)	MTH 497 - Service Learning in Mathematics II (1)
MTH 498 - Independent Research in Mathematics I (2)	MTH 498 - Independent Research in Mathematics I (2)
MTH 499 - Independent Research in Mathematics II (1)	MTH 499 - Independent Research in Mathematics II (1)
CSC 311 - R for Computational Science (1)	CSC 311 - R for Computational Science (1)
HON 498 - Honors Project I (2)	HON 498 - Honors Project I (2)
HON 499 - Honors Project II (1)	HON 499 - Honors Project II (1)
Total Elective Units: 5	**Total Elective Units: 8**
Total non-GE units: 55 (note that this total should have been 57 but an error introduced somewhere in the list of electives dropped it to 55)	**Total non-GE units: 57**
Recommended Electives for Mathematics Tracks:	**Recommended Electives for Mathematics Tracks:**
Graduate School: One semester of independent study continuing Abstract Algebra or Real Analysis, Complex Analysis, Honors Project or Independent Research in Mathematics.	**Graduate School:** One semester of independent study continuing Abstract Algebra or Real Analysis, Complex Analysis, Honors Project or Independent Research in Mathematics.
Teaching: The university's agreement with the State of California requires students seeking a Single Subject Teaching Credential in Mathematics to take Topics in Geometry, Mathematical Probability, Discrete Mathematics, Complex Analysis and Secondary School Mathematics. In addition, students must take EDU 302 - Foundations of Education and Learning Theory. EDU 404 - Foundations of Special Education is also recommended.	**Teaching:** ~~The university's agreement with the State of California requires students seeking a Single Subject Teaching Credential in Mathematics to take~~ To prepare for the State of California exams necessary for obtaining a single subject credential in mathematics: Topics in Geometry, Mathematical Probability, Discrete Mathematics, Complex Analysis ~~and Secondary School Mathematics~~ and EDU 433 (3) Methods for Teaching Secondary Mathematics. In addition, ~~students must take~~ EDU 302 - Foundations of Education and Learning Theory and EDU 404 - Foundations of Special Education can be taken as an undergraduate in preparation for taking graduate classes for a teaching credential.~~is also recommended~~.

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Industry: Complex Analysis, Mathematical Probability, and Mathematical Modeling. Additional knowledge of computer programming and software tools such as Matlab and R can be helpful in this field.

Actuary: MTH 392 Mathematical Probability, MTH 343 Discrete Mathematics, MTH 373 Mathematical Modeling, ECO 101 Macroeconomics, ECO 102 Microeconomics, ACC 201 Principles of Financial Accounting I, FIN 335 Business Finance and FIN 385 Intermediate Finance will be helpful in preparing for actuarial exams.

Industry: Complex Analysis, Mathematical Probability, and Mathematical Modeling. Additional knowledge of computer programming and software tools such as Matlab and R can be helpful in this field.

Actuary: MTH 392 Mathematical Probability, MTH 343 Discrete Mathematics, MTH 373 Mathematical Modeling will help you prepare for actuarial exams. We recommend that you take the first exam as soon as you finish MTH382 and MTH392. The Society of Actuaries has approved: ECO 101 Macroeconomics, ECO 102 Microeconomics to meet their economics requirement (you must get at least a B in each). The Society of Actuaries has also approved the sequence: ACC200 (ACC 201 Principles of Financial Accounting I can be substituted), FIN 335 Business Finance and FIN 385 Intermediate Finance to meet their Finance requirement. So with some work, you can meet 3 of the 10 items required for becoming a Fellow of the Society of Actuaries before you graduate from college. It is also worth noting that by adding a few classes to this list, you can earn a minor in Finance. in preparing for actuarial exams.

Existing Mathematics BA	Proposed Mathematics BA
Lower-Division Requirements	**Lower-Division Requirements**
MTH 164 - Calculus I (GE) (4)	MTH 164 - Calculus I (GE) (4)
MTH 174 - Calculus II (4)	MTH 174 - Calculus II (4)
MTH 233 - Linear Algebra (3)	MTH 233 - Linear Algebra (3)
MTH 242 - Number Theory with Proofs (2)	MTH 242 - Number Theory with Proofs (2)
MTH 274 - Calculus III (4)	MTH 274 - Calculus III (4)
CSC 143 - Introduction to Computer Programming (3)	CSC 143 - Introduction to Computer Programming (3)
CSC 153 - Fundamentals of Computer Science (3)	CSC 154 – Object Oriented Programming (4)
Total Lower Division Units: 23 (19 non-GE units)	**Total Lower Division Units: 24 (20 non-GE units)**
Upper-Division Requirements	Upper-Division Requirements
MTH 352 - History of Mathematics (2)	MTH 352 - History of Mathematics (2)
MTH 382 - Mathematical Statistics (2)	MTH 382 - Mathematical Statistics (2)
MTH 481 - Senior Seminar in Mathematics (1)	MTH 481 - Senior Seminar in Mathematics (1)
Choose one course from:	Choose one course from:
MTH 424 - Real Analysis (4)	MTH 424 - Real Analysis (4)
MTH 444 - Abstract Algebra (4)	MTH 444 - Abstract Algebra (4)
Choose one course from:	Choose one course from:
MTH 333 - Differential Equations (3)	MTH 333 - Differential Equations (3)
MTH 343 - Discrete Mathematics (3)	MTH 343 - Discrete Mathematics (3)
MTH 373 - Mathematical Modeling (3)	MTH 373 - Mathematical Modeling (3)
MTH 413 - Complex Analysis (3)	MTH 413 - Complex Analysis (3)
Choose one sequence from:	Choose one sequence from:
MTH 496 - Service Learning in Mathematics I (2) AND	MTH 496 - Service Learning in Mathematics I (2) AND
MTH 497 - Service Learning in Mathematics II (1)	MTH 497 - Service Learning in Mathematics II (1)
MTH 498 - Independent Research in Mathematics I (2) AND	MTH 498 - Independent Research in Mathematics I (2) AND
MTH 499 - Independent Research in Mathematics II (1)	MTH 499 - Independent Research in Mathematics II (1)
HON 498 - Honors Project I (2) AND	HON 498 - Honors Project I (2) AND
HON 499 - Honors Project II (1)	HON 499 - Honors Project II (1)
Total Upper Division: 15	**Total Upper Division: 15**

Eight additional elective units from:	Eight additional elective units from:
MTH 333 - Differential Equations (3)	MTH 333 - Differential Equations (3)
MTH 343 - Discrete Mathematics (3)	MTH 343 - Discrete Mathematics (3)
MTH 373 - Mathematical Modeling (3)	MTH 373 - Mathematical Modeling (3)
MTH 392 - Mathematical Probability (2)	MTH 392 - Mathematical Probability (2)
MTH 402 - Topics in Geometry (2)	MTH 402 - Topics in Geometry (2)
MTH 413 - Complex Analysis (3)	MTH 413 - Complex Analysis (3)
MTH 424 - Real Analysis (4)	MTH 424 - Real Analysis (4)
MTH 444 - Abstract Algebra (4)	MTH 444 - Abstract Algebra (4)
MTH 463 - Secondary School Mathematics (3)	~~MTH 463 - Secondary School Mathematics (3)~~
MTH 471 - History of Mathematics Study Tour (1)	MTH 471 - History of Mathematics Study Tour (1)
MTH 491 - Independent Study in Mathematics (1-4)	MTH 491 - Independent Study in Mathematics (1-4)
MTH 492 - Special Topics in Mathematics (2)	MTH 492 - Special Topics in Mathematics (2)
MTH 496 - Service Learning in Mathematics I (2)	MTH 496 - Service Learning in Mathematics I (2)
MTH 497 - Service Learning in Mathematics II (1)	MTH 497 - Service Learning in Mathematics II (1)
MTH 498 - Independent Research in Mathematics I (2)	MTH 498 - Independent Research in Mathematics I (2)
MTH 499 - Independent Research in Mathematics II (1)	MTH 499 - Independent Research in Mathematics II (1)
CSC 311 - R for Computational Science (1)	CSC 311 - R for Computational Science (1)
HON 498 - Honors Project I (2)	HON 498 - Honors Project I (2)
HON 499 - Honors Project II (1)	HON 499 - Honors Project II (1)
Total Elective Units: 8	**Total Elective Units: 8**
Total non-GE Units: 42	**Total non-GE Units: 43**

Proposal XIII: Make minor modifications to the computational science minors to reflect the changes in computer science classes.

See the next page for the side by side comparison. These adjustments incorporate the computer science and information systems course changes while preserving the rules for minors:
- 9 units distinct from the major
- 12 upper division units

Computational Science Minor - Biology/Environmental Science	Updated Computational Science Minor - Biology/Environmental Science
A minor in Computational Science is offered to those who wish to combine their knowledge of Biology, Chemistry or Physics with Mathematics and Computer Science. This minor allows students to have the skills to work in cross disciplinary teams to solve challenging scientific problems. This minor is intended for students majoring in Biology, Chemistry, Computer Science, Mathematics or Physics.	A minor in Computational Science is offered to those who wish to combine their knowledge of Biology, Chemistry or Physics with Mathematics and Computer Science. This minor allows students to have the skills to work in cross disciplinary teams to solve challenging scientific problems. This minor is intended for students majoring in Biology, Chemistry, Computer Science, Mathematics or Physics.
Computational Science Core CSC 143 - Introduction to Computer Programming (3) CSC 302 - Unix and Python Scripting for Computational Science (2)	**Computational Science Core** CSC 143 - Introduction to Computer Programming (3) CSC 302 - Unix and Python Scripting for Computational Science (2)
Courses for Environmental Science Emphasis	**Courses for Environmental Science Emphasis**
Lower-Division Requirements BIO 211 - Ecological and Evolutionary Systems (GE) (4)	**Lower-Division Requirements** BIO 211 - Ecological and Evolutionary Systems (GE) (4)
Upper-Division Requirements BIO 363 - Conservation Ecology (3) CSC 311 - R for Computational Science (1)	**Upper-Division Requirements** BIO 363 - Conservation Ecology (3) CSC 311 - R for Computational Science (1)
PROJECT: (Choose One Set) HON 498 - Honors Project I (2) HON 499 - Honors Project II (1) OR MTH 496 - Service Learning in Mathematics I (2) MTH 497 - Service Learning in Mathematics II (1) OR CSC 496 - Service Learning in Computer Science I (2) CSC 497 - Service Learning in Computer Science II (1)	**PROJECT: (Choose One Set)** HON 498 - Honors Project I (2) HON 499 - Honors Project II (1) OR MTH 496 - Service Learning in Mathematics I (2) MTH 497 - Service Learning in Mathematics II (1) OR CSC 496 - Service Learning in Computer Science I (2) CSC 497 - Service Learning in Computer Science II (1)
Biology Major - Required Courses MTH 144 - Calculus With Applications (GE) (4) CSC 322 - Data Management for Computational Science (2) MTH 362 - Calculus Based Statistics (2) **Minor Total for Biology Majors: 24**	**Biology Major - Required Courses** MTH 144 - Calculus With Applications (GE) (4) CSC 322 - Data Management for Computational Science (2) MTH 362 - Calculus Based Statistics (2) **Minor Total for Biology Majors: 24**

Computer Science or Computer Information Systems Majors - Required Courses	Computer Science or Computer Information Systems Majors - Required Courses
MTH 164 - Calculus I (GE) (4)	MTH 164 - Calculus I (GE) (4)
ISS 414 - Data Base Management Systems (4)	ISS 414 - Data Base Systems and Web Integration (4)
MTH 382 - Mathematical Statistics (2)	MTH382 Mathematical Statistics (3)
Minor Total for Comp Sci/CIS Majors: 26	**Minor Total for Comp Sci/CIS Majors: 26**
Mathematics Majors - Required Courses	**Mathematics Majors - Required Courses**
MTH 164 - Calculus I (GE) (4)	MTH 164 - Calculus I (GE) (4)
CSC 322 - Data Management for Computational Science (2)	CSC 322 - Data Management for Computational Science (2)
MTH 382 - Mathematical Statistics (2)	MTH 382 - Mathematical Statistics (2)
Minor Total for Mathematics Majors: 24	**Minor Total for Mathematics Majors: 24**

Computational Science Minor - Biology/Genetics	Updated Computational Science Minor - Biology/Genetics
Core Courses for Genetics Emphasis **Lower-Division Requirements** BIO 210 - Cell Biology and Biochemistry (GE) (4) CSC 143 - Introduction to Computer Programming (3)	**Core Courses for Genetics Emphasis** **Lower-Division Requirements** BIO 210 - Cell Biology and Biochemistry (GE) (4) CSC 143 - Introduction to Computer Programming (3)
Upper-Division Requirements BIO 345 - Genetics (4) CSC 302 - Unix and Python Scripting for Computational Science (2) CSC 311 - R for Computational Science (1)	**Upper-Division Requirements** BIO 345 - Genetics (4) CSC 302 - Unix and Python Scripting for Computational Science (2) CSC 311 - R for Computational Science (1)
PROJECT: (Choose One Set) required for CSC & MTH Majors HON 498 - Honors Project I (2) HON 499 - Honors Project II (1) OR MTH 496 - Service Learning in Mathematics I (2) MTH 497 - Service Learning in Mathematics II (1) OR CSC 496 - Service Learning in Computer Science I (2) CSC 497 - Service Learning in Computer Science II (1)	**PROJECT: (Choose One Set)** ~~required for CSC & MTH Majors~~ HON 498 - Honors Project I (2) HON 499 - Honors Project II (1) OR MTH 496 - Service Learning in Mathematics I (2) MTH 497 - Service Learning in Mathematics II (1) OR CSC 496 - Service Learning in Computer Science I (2) CSC 497 - Service Learning in Computer Science II (1)
Biology Major - Required Courses MTH 144 - Calculus With Applications (GE) (4) CSC 322 - Data Management for Computational Science (2) MTH 362 - Calculus Based Statistics (2) **Minor Total for Biology Majors: 25**	**Biology Major - Required Courses** MTH 144 - Calculus With Applications (GE) (4) CSC 322 - Data Management for Computational Science (2) MTH 362 - Calculus Based Statistics (2) **Minor Total for Biology Majors: 25**
Computer Science or Computer Information Systems Majors - Required Courses MTH 164 - Calculus I (GE) (4) ISS 414 - Data Base Management Systems (4) MTH 382 - Mathematical Statistics (2) **Minor Total for Comp Sci/CIS Majors: 27**	**Computer Science or Computer Information Systems Majors - Required Courses** MTH 164 - Calculus I (GE) (4) ISS 414 - Data Base Systems and Web Integration (4) MTH382 Mathematical Statistics (3) **Minor Total for Comp Sci/CIS Majors: 27**
Mathematics Majors - Required Courses MTH 164 - Calculus I (GE) (4) CSC 322 - Data Management for Computational Science (2) MTH 382 - Mathematical Statistics (2) **Minor Total for Mathematics Majors: 25**	**Mathematics Majors - Required Courses** MTH 164 - Calculus I (GE) (4) CSC 322 - Data Management for Computational Science (2) MTH 382 - Mathematical Statistics (2) **Minor Total for Mathematics Majors: 25**

Computational Science Minor – Chemistry	Updated Computational Science Minor – Chemistry
Core Courses for Chemistry Emphasis	**Core Courses for Chemistry Emphasis**
Lower-Division Requirements	**Lower-Division Requirements**
CHE 152 - General Chemistry I (GE) (4)	CHE 152 - General Chemistry I (GE) (4)
CHE 153 - General Chemistry II (4)	CHE 153 - General Chemistry II (4)
CSC 143 - Introduction to Computer Programming (3)	CSC 143 - Introduction to Computer Programming (3)
MTH 164 - Calculus I (GE) (4)	MTH 164 - Calculus I (GE) (4)
Upper-Division Requirements	**Upper-Division Requirements**
CSC 302 - Unix and Python Scripting for Computational Science (2)	CSC 302 - Unix and Python Scripting for Computational Science (2)
CSC 311 - R for Computational Science (1)	CSC 311 - R for Computational Science (1)
PROJECT: (Choose One Set) Required for Comp Sci/CIS & Mathematics Majors	**PROJECT: (Choose One Set)** ~~Required for Comp Sci/CIS & Mathematics Majors~~
HON 498 - Honors Project I (2)	HON 498 - Honors Project I (2)
HON 499 - Honors Project II (1)	HON 499 - Honors Project II (1)
OR	OR
MTH 496 - Service Learning in Mathematics I (2)	MTH 496 - Service Learning in Mathematics I (2)
MTH 497 - Service Learning in Mathematics II (1)	MTH 497 - Service Learning in Mathematics II (1)
OR	OR
CSC 496 - Service Learning in Computer Science I (2)	CSC 496 - Service Learning in Computer Science I (2)
CSC 497 - Service Learning in Computer Science II (1)	CSC 497 - Service Learning in Computer Science II (1)
Chemistry Major - Required Courses	**Chemistry Major - Required Courses**
CHE 213 - Analytical Chemistry (3)	CHE 213 - Analytical Chemistry (3)
CHE 325 - Physical Chemistry I (5)	CHE 325 - Physical Chemistry I (5)
CSC 322 - Data Management for Computational Science (2)	CSC 322 - Data Management for Computational Science (2)
MTH 362 - Calculus Based Statistics (2)	MTH 362 - Calculus Based Statistics (2)
OR	OR
MTH 382 - Mathematical Statistics (2)	MTH 382 - Mathematical Statistics (2)
Minor Total for Chemistry Majors: 33	**Minor Total for Chemistry Majors: 33**

Computer Science or Computer Information Systems Majors - Required Courses	Computer Science or Computer Information Systems Majors - Required Courses
ISS 414 - Data Base Management Systems (4) MTH 382 - Mathematical Statistics (2) **Minor Total for Comp Sci/CIS Majors: 27**	ISS 414 - Data Base Systems and Web Integration (4) MTH382 Mathematical Statistics (3) **Minor Total for Comp Sci/CIS Majors: 27**
Mathematics Majors - Required Courses CHE 213 - Analytical Chemistry (3) CHE 325 - Physical Chemistry I (5) CSC 322 - Data Management for Computational Science (2) MTH 382 - Mathematical Statistics (2) **Minor Total for Mathematics Majors: 33**	**Mathematics Majors - Required Courses** CHE 213 - Analytical Chemistry (3) CHE 325 - Physical Chemistry I (5) CSC 322 - Data Management for Computational Science (2) MTH 382 - Mathematical Statistics (2) **Minor Total for Mathematics Majors: 33**

Computational Science Minor - Physics	Updated Computational Science Minor - Physics
Core Courses for Physics Emphasis	**Core Courses for Physics Emphasis**
Lower-Division Requirements CSC 143 - Introduction to Computer Programming (3) MTH 164 - Calculus I (GE) (4) PHY 241 - University Physics I (GE) (4) PHY 242 - University Physics II (4)	**Lower-Division Requirements** CSC 143 - Introduction to Computer Programming (3) MTH 164 - Calculus I (GE) (4) PHY 241 - University Physics I (GE) (4) PHY 242 - University Physics II (4)
Upper-Division Requirements CSC 302 - Unix and Python Scripting for Computational Science (2) MTH 382 - Mathematical Statistics (2)	**Upper-Division Requirements** CSC 302 - Unix and Python Scripting for Computational Science (2) MTH 382 - Mathematical Statistics (2)
Physics or Engineering-Physics Major - Required Courses EGR 120 - Computational Methods for Engineers & Scientists II (1) CSC 322 - Data Management for Computational Science (2) PHY 304 - Modern Physics (4) PHY 475 - Senior Laboratory and Student Project (2) **Minor Total for PHY & PHY/EGR Majors: 28**	**Physics or Engineering-Physics Major - Required Courses** EGR 120 - Computational Methods for Engineers & Scientists II (1) CSC 322 - Data Management for Computational Science (2) PHY 304 - Modern Physics (4) PHY 475 - Senior Laboratory and Student Project (2) **Minor Total for PHY & PHY/EGR Majors: 28**
Computer Science or Computer Information Systems Majors - Required Courses CSC 311 - R for Computational Science (1) ISS 414 - Data Base Management Systems (4)	**Computer Science or Computer Information Systems Majors - Required Courses** CSC 311 - R for Computational Science (1) ISS 414 - Data Base Systems and Web Integration (4)
PROJECT: (Choose One Set) HON 498 - Honors Project I (2) HON 499 - Honors Project II (1) OR MTH 496 - Service Learning in Mathematics I (2) MTH 497 - Service Learning in Mathematics II (1) OR CSC 496 - Service Learning in Computer Science I (2) CSC 497 - Service Learning in Computer Science II (1) **Minor Total for Comp Sci/CIS Majors: 27**	PROJECT: (Choose One Set) HON 498 - Honors Project I (2) HON 499 - Honors Project II (1) OR MTH 496 - Service Learning in Mathematics I (2) MTH 497 - Service Learning in Mathematics II (1) OR CSC 496 - Service Learning in Computer Science I (2) CSC 497 - Service Learning in Computer Science II (1) **Minor Total for Comp Sci/CIS Majors: 27**

Mathematics Majors - Required Courses	Mathematics Majors - Required Courses
CSC 311 - R for Computational Science (1)	CSC 311 - R for Computational Science (1)
CSC 322 - Data Management for Computational Science (2)	CSC 322 - Data Management for Computational Science (2)
PHY 304 - Modern Physics (4)	PHY 304 - Modern Physics (4)
PROJECT: (Choose One Set)	PROJECT: (Choose One Set)
HON 498 - Honors Project I (2)	HON 498 - Honors Project I (2)
HON 499 - Honors Project II (1)	HON 499 - Honors Project II (1)
OR	OR
MTH 496 - Service Learning in Mathematics I (2)	MTH 496 - Service Learning in Mathematics I (2)
MTH 497 - Service Learning in Mathematics II (1)	MTH 497 - Service Learning in Mathematics II (1)
OR	OR
CSC 496 - Service Learning in Computer Science I (2)	CSC 496 - Service Learning in Computer Science I (2)
CSC 497 - Service Learning in Computer Science II (1)	CSC 497 - Service Learning in Computer Science II (1)
Minor Total for Mathematics Majors: 31	**Minor Total for Mathematics Majors: 31**

V.   Recorded Department/School Vote:

Please state the number and percentage of department school faculty who voted for the proposal. If other departments are affected, please inform the committee how those departments voted.

MICS: Approved

FSB:
MTH153 and MTH173 creation: Approved
Information Systems joint major creation: Approved

VI.   Library Impact:

What new library acquisitions, if any, will be needed to support the proposed changes?
(If none, please state that.)   Please consult the check off list at the end of the template.

None.

VII.   Technological Impact:

What additional or new software, hardware, lab space or tech supported space will be needed to support the proposed changes? (If none, please state that.)   For hybrid, online or video conferencing proposals, please answer questions at the end of the template.

None

VIII. Records and Graduation Requirements Impact:

1. Have course number changes been discussed with Records?
Email listing course numbers sent to records 11/7/14.

2. Have you verified meeting minimum number of units for majors or minors with proposed changes?
N/A

3. If changing a course from upper to lower division (or vice versa), have you verified that changes meet minimum standards for majors, minors and or graduation?
N/A

4. For proposed elimination or changes of courses, can you confirm that they are not used by other departments, or that those departments will not be affected?

Yes. MTH123 is used by Business and occasionally by the sciences. Business' needs will be met with the

new courses designed specifically for them MTH153 and MTH173 (see Proposal V). The students in the sciences only take MTH123 when they cannot take MTH133. We will now be offering MTH133 each semester to meet the needs of science students.

IX. WASC Credit Hour Standards: All new course proposals must meet the standards as set by the United States Department of Education with regard to the credit hour definition. One semester unit represents an hour (minimum fifty minutes) of class time per week for at least 15 weeks (Carnegie definition). Two hours of preparation are normal for each hour of class. Please state how this new course(s) will meet those minimum requirements. See section on distance learning to answer questions on hybrid, online, and video conferencing courses.

> **Direct instructional hours are equivalent to the following:**
>
> 1 credit hour =750 minutes instructional time
> 2 credit hours=1,500 minutes
> 3 credit hours=2,250 minutes
> 4 credit hours=3000 minutes
> 5 credit hours=3750 minutes

   All courses and programs will meet the requirements using seat time. All classes are face to face.

X. Final Summary: Review course and staffing impact with your College Dean or appropriate administrator.

> **I have entered the information in summary form. To see the information in detail see the spreadsheet below.**
>
> **Total course additions: 6**
>
> **Total course deletions: 8**
>
> **Total unit additions: 17.5**
>
> **Total unit deletions: 21.5**
>
> **Rotation of courses or deletion of sections to accommodate additions: Increase 3 sections (9 units) and decrease 3 sections (9 unit) for no change**
>
> **Staffing impact/increase or decrease: None the small difference in units is taken up the need for an additional section of MTH362 to support Biology.**

	Annual Units	Alt Year Units	# Sections	Annual Impact		
Course Additions						
CSC252	2		1	0	This is the first quad of CSC254 so no impact	
ISS123	3		1	3		
ISS342		2	1	1		
ISS493		3	1	1.5		
MTH153	3		2	6		
MTH173	3		2	6		
				17.5		
Course Deletions						
CSC181	-1		2	-2	Eliminated from Schedule 2014-15	
MTH463		-3	1	-1.5	Eliminated from Schedule 2014-15	
MTH123	-3		3	-9		
CSC133	-3		1	-3		
CSC354		-4	1	-2		
CSC422		-2	1	-1		
ISS242		-2	1	-1		
ISS424		-4	1	-2		
				-21.5		
Changes in Courses						
CSC153 becomes CSC154	1		1	1	3 unit class becomes 4 unit class	
CSC254 (no unit change)				0		
CSC314 (no unit change)				0		
CSC342 becomes CSC323		-1	1	-0.5		
CSC374 becomes ISS373		-1	1	-0.5		
ISS414 (no unit change)				0		
				0		
Existing Course Increase Sections						
MTH133	3		1	3	One additional section per year	
MTH113	3		1	3	One additional section per year	
MTH203	3		1	3	One additional section per year to meet needs of FSB - discussed in proposal	
				9		
Existing Course Decrease Sections						
MTH303	-3		3	-9	Note that we have been teaching 10-11 sections per year and this drops us to 7-8.	
				-9		
			Total in Proposal	**-4**	**3.5 of these eliminated in 2014-15**	
Not in class changes but necessary in load considerations						
MTH362	2		1	2	BIO300 and MTH362 are a paired set of classes. Biology is increasing the number of BIO300 classes each year by 1 section.	
				2		
			Grand Total	**-2**		

Comparison of Proposed Information Systems Major to Other ACBSP Accredited Majors at PLNU

*The six rightmost major columns (Accounting, Economics, Finance, Intl Develop, Management, Marketing) fall under the heading: **BS in Business Administration**.*

Business Common Core*	units	Information Systems (BS)	Units	Notes	Major in Accounting	units	Major in Economics	units	Major in Finance	units	Major in Intl Develop	units	Major in Management	units	Major in Marketing	units
First Year	units		Units	Notes		units		units		units		units		units		units
BUS 100, Intro Bus	3	ISS133 Intro to Information Systems	3	Swap Intro classes	Common Core	43	Common Core	43	Common Core	43	Common Core	43	Common Core	43	Common Core	43
ECO 101, Prin Macro (GE)	3	ECO100 (GE)	3	Swap econs	ACC 370, Interm Acc I	3	ECO 305, Math Econ	3	FIN 385, Interm Fin	3	BUS 475, Sustainability	3	MGT 374, HR Mgmt	3	MKT 333, Cons Behavior	3
ECO 102, Prin Micro (GE)	3				ACC 371, Interm Acc II	3	ECO 310, Interm Micro	3	FIN 415, Investments	3	ECO 315, Econ Develop	3	MGT 320, Org Behavior	3	MKT 336, Integ Mkt Com	3
MTH 123/133, Pre-calculus	3	MTH173 Business Calculus (GE)	3	Calculus replaces MTH123/133	ACC 375, Interm Mgrl	3	ECO 330, Interm Macro	3	FIN 425, Fin Analysis	3	ECO 450, His Econ Thot	3	Select one:	3	MKT 334, Sales & SMgt	3
Second Year		ACC 201, Prin Financial Acc	4		ACC 410, Tax I	3	ECO 460, Econometrics	3	FIN 435, Internatl Fin	3	MGT 412, Leadership	3	MGT 412, Leadership	3	MKT 340, Internatl Mkt	3
ACC 201, Prin Financial Acc	4	ACC 202, Prin Mgrial Acc	3		ACC 411, Tax II	3	Two courses from:	6	Elective 1 (UD Econ):	3	MGT 470, NP Mgmt	3	MGT 484, Ops Mgmt	3	MKT 432, Mkt Research	3
ACC 202, Prin Mgrial Acc	3	MTH 203, Intro Statistics	3		ACC 421, Adv Acc	3	ECO 315, Econ Dev		ECO 310, Interm Micro		One course from:	3-4	Plus one concentration:		MKT 460, Mkt Strategy	3
MTH 203, Intro Statistics	3	BUS 201, Legal Environment	3		ACC 425, Fin Analysis	3	ECO 320, Urban Econ		ECO 380, Mon & Bankng		ECO 320, Urban Econ		1: Global Business			
BUS 201, Legal Environment	3	MGT 212, Prin Management	3		ACC 460, Auditing	3	ECO 380, Mon & Bankng		BUS 340, Real Estate		ECO 460, Econometrics		MKT 340, Internatl Mkt	3		
MGT 212, Prin Management	3						ECO 410, Internatl Econ				ECO 470, Cont Dev Plan		FIN 435, Internatl Fin	3		
Third Year		BUS 313, Admin Com	3				ECO 440, Race/Gender		Elective 2 (Accounting):	3	ECO 410, Internatl Econ		ECO 410, Internatl Econ	3		
BUS 313, Admin Com	3	MKT 332, Prin Marketing	3				ECO 450, His Econ Thot		ACC 370, Interm Acct I		ECO 440, Race/Gender		Required: study abroad			
MKT 332, Prin Marketing	3	FIN 335, Business Finance	3						ACC 375, Interm Mgrl Acc		ECO 490, Special Topics					
FIN 335, Business Finance	3								ACC 410, Tax I		MGT 382, Entreprenrshp		2: Entrepreneurship			
Fourth Year		BUS 480, International Bus	3								POL 420, US Foreign Policy		MGT 382, Entreprenrshp	3		
BUS 480, International Bus	3	MGT 488, Strategic Mgmt	3								POL 435, Global Govern		FIN 415, Investments	3		
MGT 488, Strategic Mgmt	3			Swap interhsip to save units issue							POL 370, Comp Politics		One course from:			
BUS 489, Bus Internship	3	ISS472 Internship	2								POL 301, Trans to Democ		BUS 475, Sustainability			
Common Core	43	CSC143 Intro to Computer Progr	3								SOC 444, Globaliz & Culture		FIN 385, Interm Fin			
		CSC154 Object Oriented Programm	4								FCS 315, PFC Health		MKT 334, Sales & SMgt			
		CSC252 Data Structures in C++	2	first half of CSC254									BUS 340, Real Estate			
		ISS314 Operating Systems	4								Required: approved study		MKT 336, Integ Mkt Com			
		ISS373 Networking and Security	3								abroad in a developing country		BUS 490, Special Topics			
		ISS493 Information Systems Project	3	Project focused on design, budgeting and purchasing									3: Non-profit			
BA, Business Administration		ISS343 Project Mgt and QA	2										MGT 470, NP Mgmt	3		
	units	ISS414 Data Base Systems and Web Integration	4										BUS 475, Sustainability	3		
Common Core	43	ISS481 Senior Seminar	1		Recommended: calculus		Recommended: calculus		Recommended: calculus				MGT 382, Entreprenrshp	3		
ECO 300-490, Econ Elective	3															
BUS/FIN/MKT/MGT 300-490	3	Total	68		Core plus 24 units		Core plus 18 units		Core plus 18 units		Core plus 18-19 units		Core plus 18 units		Core plus 18 units	
Total units beyond GE	49	Total beyond GE	62		Total units beyond GE	67	Total units beyond GE	61	Total units beyond GE	61	Total units beyond GE	61-62	Total units beyond GE	61	Total units beyond GE	61

Final Check-off List:

_x_ The College Dean or appropriate administrator has been consulted.

_x_ All affected departments have been contacted and the results are indicated in the proposal.

_x_ The proposal has been voted on by the department.

_x_ Appropriate contacts have been made with the director of the library as well as media services. With whom have you spoken? N/A

_x__Staffing impact has been addressed.

_x__For hybrid, online and video conferencing courses, the Dean of Extended Learning has signed off verifying appropriate pedagogical expertise. N/A

_x__Appropriate budget considerations have been reviewed.

_x__Office of Records has been consulted for appropriate course numbering sequences for face to face and/or hybrid and online courses.