ACADEMIC POLICIES COMMITTEE
LONG FORM PROPOSAL TEMPLATE

- Proposals should use this long form if they:
  - Need faculty and/or WASC approval.
  - Request elimination, addition or revision of multiple courses and/or courses impacting other departments or schools.
  - Request elimination, addition or revision of a major, minor, concentration or credential program.
- All submitted proposals need to adhere to the following template in order to facilitate the work of the Academic Policies Committee.

Section 1: Proposal Summary

1. **Today's Date:** September 25, 2018
2. **Academic Unit Name:**
   Mathematical, Information and Computer Sciences
   Physics and Engineering
3. **Submitted by:** Maria Zack
4. **Recorded Department/School Vote** (Please provide the number and percentage of department/school faculty who voted in approval for this proposal):
   11, 100% of those who are not on sabbatical
5. **Academic Year** (Provide academic year and semester changes are to take place):
   Fall 2019
6. **Is this proposal a result of a Program Review (Yes/No)? If not, please provide explanation:**
   We are in the midst of a program review but have had to slow down due to the unexpected resignation of a key engineering faculty member. We have the curriculum designed but have not completed the paperwork for the review. We want to move forward with a few curricular changes:
   - Adding a degree for ADT transfers: Mathematics BA (ADT)
   - Adding a degree for ADT transfers: Physics BA (ADT)
   - Adding a major in Data Science (among other things, this would be the major for mathematics students who want to become actuaries)
   - Adding Computer Science – Cyber Security
   - A limited number of course additions or adjustment to facilitate the creation of these degrees.
7. **Overall Proposal Rationale** (Briefly describe the nature of the proposed changes or the proposed new academic offering):

We are making a few minor changes in curriculum to facilitate PLNU's acceptance of ADT degrees for transfer students. We are also adding options to our mathematics and computer science degrees that address high-demand career opportunities.

Section 2: Impact

1. **Impact on Other Department(s)/School(s)** (Are there other departments/schools impacted by this proposal? If so, how did the other department[s]/school[s] vote on this proposal?):

    - School of Business (pending): vote on Finance Track for Data Science Degree

        From: Daniel Bothe <dbothe@pointloma.edu>
        Date: Fri, Oct 5, 2018 at 4:30 PM
        Subject: Re: APC Change
        To: Maria Zack <MariaZack@pointloma.edu>

        Maria:
        Looks good! The FSB is fine with this.
        Thanks!
        Dan

    - Biology Department (pending): vote on Biology Track in Data Science Degree

        Biology Department made recommendations after discussion 10/10/18 that have been incorporated into this proposal.

2. **Impact on Library Services:**
    a. Will there be any new library acquisitions needed to support the proposed changes? (Yes/No):
    b. If yes, please contact the Director of Ryan Library and provide further information below.
        i. Provide the date the director was contacted:
        ii. Briefly describe the needed acquisitions:

Section 3: What and Why

Proposals (For each proposal or group of proposals, provide a description and rationale.):
In order to facilitate PLNU's acceptance of the ADT, we need to create two degrees that are tailored for that population.

Key:
Blue means name or number change
Red means new class

Mathematics BA for ADT Students

Note that all lower division mathematics courses will be transferred in from the community college. Students will bring in 18 units of mathematics (4 units are GE).

Upper-Division Requirements

- MTH 312 - Number Theory with Proofs (2) – changed this to upper division for all majors
- MTH 352 - History of Mathematics **(2)**
- MTH 383 - Mathematical Probability and Statistics **(3)**
- MTH 481 - Senior Seminar in Mathematics **(1)**

Choose one course from:

- MTH 424 - Real Analysis **(4)**
- MTH 444 - Abstract Algebra **(4)**

Choose one course from:

- MTH 333 - Differential Equations **(3)**
- MTH 343 - Discrete Mathematics **(3)**
- MTH 373 - Mathematical Modeling **(3)**
- MTH 413 - Complex Analysis **(3)**

Choose one sequence from:

- MTH 495 - Service Learning in Mathematics **(3)**
- MTH 498 - Independent Research in Mathematics I **(2)** *AND* MTH 499 - Independent Research in Mathematics II **(1)**
- HON 498 - Honors Project I **(2)** *AND* HON 499 - Honors Project II **(1)**

Total: 18 units

12 additional elective units from:

- MTH 333 - Differential Equations **(3)**
- MTH 343 - Discrete Mathematics **(3)**
- MTH 373 - Mathematical Modeling **(3)**
- MTH 402 - Topics in Geometry **(2)**
- MTH 413 - Complex Analysis **(3)**
- MTH 424 - Real Analysis **(4)**
- MTH 444 - Abstract Algebra **(4)**
- MTH 471 - History of Mathematics Study Tour **(1)**
- MTH 491 - Independent Study in Mathematics **(1-4)**
- MTH 492 - Special Topics in Mathematics **(2)**
- MTH 495 - Service Learning in Mathematics **(3)**
- MTH 498 - Independent Research in Mathematics I **(2)**
- MTH 499 - Independent Research in Mathematics II **(1)**
- CSC 143 - Introduction to Computer Programming (3)

- CSC 154 - Objects and Elementary Data Structures (4)
- CSC 311 – R and Machine Learning (1) (title change – made for Data Science major)
- ECO 460 - Applied Econometrics **(3)**
- HON 498 - Honors Project I **(2)**
- HON 499 - Honors Project II **(1)**

Total: 12 Units

Total Units: 48 (44 non-GE units)

Notes for Mathematics BA for ADT

- This leverages existing classes but changes one lower division to an upper division class. We have moved MTH242 Number Theory, which is not offered at community colleges, to upper division status (MTH242 going to MTH312). Number theory is typically an upper division course.
- We have added back the option to take computer programming by including it in the electives (it is not part of the ADT curriculum)
- MTH311 is changing titles to incorporate the information that it contains machine learning (important for the Data Science degree below)

Physics BA for ADT Students

Note that all lower division physics and mathematics courses will be transferred in from the community college. Students will bring in 24 units of mathematics (8 units are GE).

Core Curriculum

- PHY 304 - Modern Physics (4)
- PHY 341 - Analytical Mechanics and Dynamics (3)
- PHY 361 - Electricity, Magnetism, and Waves I (3)
- PHY 401 - Thermodynamics (3)
- PHY 431 - Quantum Mechanics (3)
- PHY 475 - Senior Laboratory (3)
- MTH 333 - Differential Equations (3)

Total: 22 Units

Electives:
Take eleven units from the following courses

- PHY 311 - Nuclear Physics (3)
- PHY 362 - Electricity, Magnetism, and Waves II (3)
- PHY 443 - Solid State Physics (3)
- CHE 152 - General Chemistry I (GE) (5)
- EGR 143 – Introduction to Computer Programming (3)

Total: 11 units

Total for Degree: 57 (49 without GE)

Notes for Physics BA for ADT Students

- This leverages existing classes
- It adds back the option of taking chemistry and computer programing which are not part of the community college ATD program in Physics.

Data Science

Lower-Division Requirements

- MTH 164 - Calculus I (GE) (4)
- MTH 174 - Calculus II (4)
- MTH 233 - Linear Algebra (3)
- MTH 274 - Calculus III (4)
- MTH 292 – Applied Project (2) – New Class
- MTH 312 - Number Theory with Proofs (2) – move to upper division (see ADT notes)
- CSC 143 - Introduction to Computer Programming (3)
- CSC 154 - Objects and Elementary Data Structures (4)
- CSC 252 - Data Structures in C++ (2)

Total: 28 Units (24 non-GE units)

Upper-Division Requirements

- MTH 333 - Differential Equations (3)
- MTH 343 - Discrete Mathematics (3)
- MTH 373 - Mathematical Modeling (3)
- MTH 383 - Mathematical Probability and Statistics (3)
- MTH 453 – Advanced Applied Statistics (title TBD) (3) (new class needed for VEE for actuaries)
- MTH 481 - Senior Seminar in Mathematics (1)
- CSC 302 - UNIX and Python Scripting for Computational Science (2)
- CSC 311 – R and Machine Learning (1) (title change)
- ISS 414 - Data Base Systems and Web Integration (4)

Choose one course from:

- MTH 424 - Real Analysis (4)
- MTH 444 - Abstract Algebra (4)

Choose one from:

- MTH 472 – Internship in Data Science (2)
- MTH 462 – Research in Data Science (2)

Total: 29

Application Tracks:

Finance track (actuaries)

- ACC 200 - Principles of Accounting for Non-Business Majors (3)
- One of:
    - ECO 100 - Survey of Economics (GE)
    - ECO 101 - Principles of Macroeconomics (GE)
    - ECO 102 - Principles of Microeconomics (GE)

Note: both ECO101 ECO102 are required by VEE for actuarial students

- FIN 335 - Business Finance (3)

Note that VEE requires both FIN335 – Business Finance and FIN385 – Intermediate Finance (3)

Biology Track

- BIO 210 Cell Biology and Biochemistry (3) (GE)
- BIO 210L Cell Biology and Biochemistry Lab (1) (GE)
- One of:
    - BIO 211 Ecological and Evolutionary Systems (3) and BIO211L Ecological and Evolutionary Systems Lab (1)
    - BIO 345 Genetics (3) and BIO 345L Genetics Lab (1)

Recommended: Take both BIO211/BIO211L and BIO345/BIO345L if there is space in your schedule.

Total: 33-35 Units

Note(s):
An elective class may not count as both upper-division core and a required "additional elective."

Total non-GE units: 57-59

Computer Science – Cyber Security

Lower Division Requirements
CSC 143 - Introduction to Computer Programming (3)
CSC 154 - Objects and Elementary Data Structures (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) **

Total Lower Division Units: 22 (18 units other than GE)

*MTH 144 may substitute for MTH 164 .
** MTH 363 - Calculus Based Statistics with R (3) or MTH 383 - Mathematical Probability and Statistics (3) may substitute for this class.

Upper Division Requirements
CSC 314 - Operating Systems (4)
CSC 323 - Software Engineering (3)
CSC 394 - Programming Languages (4)
CSC 454 - Computer Architecture and Assembly Language (4)

CSC 481 - Senior Seminar in Computer Science (1)
ISS 373 - Networking and Security (3)
ISS 392 - Topics in Cyber Security (2)
ISS 403 - Information and Computer Security (3)
ISS 412 – Topics in Information Security (2) (new class)
ISS 414 - Data Base Systems and Web Integration (4)
MTH 343 - Discrete Mathematics (3)

Choose one sequence from:

CSC 495 - Service Learning in Computer Science (3)

CSC 498 - Independent Research in Computer Science I (2) AND
CSC 499 - Independent Research in Computer Science II (1)

ISS 472 - Internship in Information Systems (2)

HON 498 - Honors Project I (2) AND
HON 499 - Honors Project II (1)

Total Upper Division Units: 37-38

5-6 additional units chosen from (6 units if ISS472 chosen for sequence above):
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 491 - Independent Studies in Computer Science (1-4)
CSC 493 – Software Project (3)
CSC 495 - Service Learning in Computer Science (3)
CSC 498 - Independent Research in Computer Science I (2)
CSC 499 - Independent Research in Computer Science II (1)
EGR 225 - Electronics Circuits Analysis (3)
EGR 352 - Analog Electronics (2)
EGR 422 - Digital Electronics (2)
EGR 432 - Computer Interfacing (2)
EGR 442 - Mobile Robotics (2)
HON 498 - Honors Project I (2)
HON 499 - Honors Project II (1)
ISS 342 – Project Management and Quality Assurance (2)
ISS 472 - Internship in Information Systems (2)

Total Elective Units: 5-6

Total Units for the Degree: 59 (plus 4 units of GE)

Notes for Computer Science – Cyber Security

- This is a repackaging of a collection of computer science and information systems classes for this new degree.

- Currently ISS392 Topics in Cyber Security (2) is an annual class. We will move it to an alternating year class so that we can create ISS412 Topics in Information Security (2) which will be taught in the alternate year.

Summary Course Changes:

- Renumber MTH242 Number Theory to be MTH312 Number Theory (no course description change) - no change in teaching load
- Change the name of CSC311 R for Computational Science to CSC311 R and Machine Learning (no course description change) – no change in teaching load
- Add MTH292 Applied Project (2) taught annually – increase of 2 units annually.
- Modify the course description for MTH383
- Add MTH453 Advanced Applied Statistics (3) taught in alternating years – increase of 1.5 units annually
- Add MTH 472 – Internship in Data Science (2) – currently one faculty member gets load for supervising all internships in the department so there will be no increase in teaching load since this will be added to that supervision
- Add MTH 462 – Research in Data Science (2) – this is taken as an independent study so there is not increase in teaching load
- Modify the course description for ISS392 Topics in Cyber Security and change it from an annual class to an alternating year class – a decrease of one unit annually.
- Add ISS412 Topics in Information Security (2) taught in alternating years – an increase of 1 unit annually
- Note that Sociology and Dietetics are eliminating the requirement for MTH203 from their curriculum (a reduction of 15 students in the class annually), which means that MICS should be able to reduce the number of sections of MTH203 offered annually by one – a decrease of 3 units annually.

Net unit change: 2+1.5 + 1 – 1 -3 = 0.5 units

Section 4: ***FOR NEW PROGRAMS ONLY***

A. **Course Learning Outcomes** – Please provide the course learning outcomes.
B. **Assessment Plan** – Please provide an assessment plan.

Mathematics BA for ADT Students

- The learning outcomes and assessment plan will follow what we currently do for the Mathematics major.

Physics BA for ADT Students

- The learning outcomes and assessment plan will follow what we currently do for the Physics major.

Data Science

- The learning outcomes and assessment plan will follow what we currently do for the Mathematics major. This new degree really is an applied mathematics degree.

Computer Science – Cyber Security

- The learning outcomes and assessment plan will follow what we currently do for the Computer Science major.

Section 5: Catalog Edits

- **Step 1:**
  - In the Catalog Review folder (H:\Catalog Review) provided by the VPAA Office use *track changes* to revise, add or eliminate the current and/or proposed catalog text. This applies to majors, minors, concentrations or certificates. This proposed text will accompany the proposal.
- **Step 2:**
  - Arrange a meeting with the APC chair to review the completed portion of the proposal and to receive assistance from the Records liaison in submission of current and/or draft proposed catalog copy called for.

Section 6: Summary Checklist

Review course and staffing impact with your academic unit's direct report (College Dean or Provost).

Total course additions: 6
Total course deletions: 1
Total unit additions: 11 (equivalent to 4.5 annual units of faculty load)
Total unit deletions: 1 (but with changes in MTH203, reduction of 4 units annually)

Staff impact (increase or decrease): None

Rotation of courses or deletions of sections to accommodate additions:
The change is neutral. We have added 4.5 units of faculty load and we have eliminated 4 units of faculty load in this proposal.

I have reviewed this proposal and the items above and believe the proposal meets all university requirements and is ready for APC review.

Department or School Direct Report:

_____ Date_____

College Dean or Provost as applicable:

_____ Date_____

MTH292 Applied Project (2)
This course introduces students to the complete data science process. Students will work in teams to scope a real-world problem, gather data to answer the question, wrangle the data, model it, validate the models, draw conclusions and communicate results. The course includes study of the principles of data science and technical communication. This course will integrate prior cross-disciplinary coursework and introduce students to the basics of scripting and integrating tools into full-stack solutions.

MTH 383 Mathematical Probability and Statistics (3)
A first course in probability and statistics for students with sophisticated mathematics exposure. Topics include axioms of probability, random variables, discrete and continuous distributions, mathematical expectation, limit theorems. ~~least square estimates of parameter, linear regression, experimental design, hypothesis testing, and confidence of intervals, testing of models, data analysis and appropriateness of models.~~ Introduction into descriptive and inferential statistics, including the topics of sampling distributions, point estimation and hypothesis testing. Topics are supported by the use of statistical software.

MTH 453 Advanced Applied Statistics (3)
This course is a continuation of MTH 383 including the topics of random sampling and experimental design, sampling distributions, methods of estimation and the properties of estimators, least square estimates of parameter, linear regression, hypothesis testing, and confidence intervals, testing of models, data analysis and appropriateness of models. Topics are supported by the use of statistical software. Taught in alternating years.
Prerequisite: MTH383

MTH462 Research in Data Science (2)
Independent research conducted under the guidance of a faculty mentor. The instructor and student propose the research topic. This course is graded Credit/No Credit only.
Prerequisite(s): MTH292, MTH383, approval of the department chair, consent of instructor, and Junior standing.

MTH472 Internship in Data Science (2)
A supervised experience in which the student works with industry professionals to gain experience in data science. ”C” Designation is for California Internships. “E” Designation is for Out of State Internships. May be repeated to a total of four units. This course is graded Credit/No Credit only.
Prerequisite(s): MTH292, MTH383 and consent of instructor.

ISS392 Topics in Cyber Security (2)
Study of an area of ~~information or~~ computer security otherwise included in the curriculum. Topics are determined by the needs and interest of the students and faculty involved. May be repeated up to a total of ~~six~~ four (~~6~~4) units. Taught in alternating years

ISS412 Topics in Information Security (2)
Study of an area of information security otherwise included in the curriculum. Topics are determined by the needs and interest of the students and faculty involved. May be repeated up to a total of four (4) units. Taught in alternating years