CALIFORNIA STATE POLYTECHNIC UNIVERSITY, POMONA

ACADEMIC SENATE

GENERAL EDUCATION COMMITTEE

REPORT TO

THE ACADEMIC SENATE

GE-007-178

STA 1202 – Statistics with Applications Stretch II

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| General Education Committee | Date: | 04/11/2018 |
| Executive Committee Received and Forwarded | Date: | 04/18/2018 |
| Academic Senate | Date: | 05/02/2018 <u>First Reading</u> |

BACKGROUND:

This is a new statistics course to be in accordance with the revised EO 1110 as it applies to GE Area B4. STA 1201 (and STA1201A) is a prerequisite for STA 1202. STA 1201 and STA 1202 together are equivalent to STA 1200, and GE credit for Area B4 is awarded upon completion of STA 1202. This path is designed to serve students with majors that require no college-level mathematics beyond introductory freshman-level statistics. STA 1201 (2 units) and STA 1201A (1 unit) together are not necessarily a GE course, but because the year-long sequence of 1201 and 1202 together satisfy the requirements of GE Area B4, the GE Committee evaluated all these ECO's and found them to meet those requirements.

RESOURCES CONSULTED:

Faculty
Department Chairs
Associate Deans
Deans
Office of Academic Programs

DISCUSSION:

The GE Committee reviewed this course and found it to satisfy the requirements of GE Area B4.

RECOMMENDATION:

The GE Committee recommends approval of GE-007-178, STA 1202 – Statistics with Applications Stretch II as the second of a one-year sequence and that completion of the year-long sequence satisfies the requirements for GE Area B4.

# STA - 1202 - Statistics with Applications Stretch II

### C. Course - New General Education* Updated

## General Catalog Information

**\*\*READ BEFORE YOU BEGIN\*\***

Import curriculum data from the Catalog by clicking on the following icon ⬇. It is a BEST PRACTICE to always import data on existing courses. This will limit the opportunity for data errors.

Turn the help text on by clicking on the following icon ℹ.

All fields with an asterisk (*) are required fields. If left blank, the request will not be launched and cannot be acted upon.

Run and attach an impact report by clicking 📘 to show all courses and programs impacted by this proposal.

Attach additional documentation by clicking ➕.

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|---|---|
| **Department*** | Mathematics and Statistics |

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|---|---|---|---|
| **Semester Subject Area*** | STA | **Semester** 1202 **Catalog Number*** | |

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|---|---|---|---|
| **Quarter Subject Area** | | **Quarter Catalog Number** | |

**Course Title*** Statistics with Applications Stretch II

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| **Units*** | (3) |

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| **C/S Classification *** | C-04 (Lecture/Recitation) |

**To view C/S Classification Long Description click: http://www.cpp.edu/~academic-programs /scheduling/Documents/Curriculum%20Guide/Appendix_C_CS_Classification.pdf**

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| **Component*** | Lecture |

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| **Instruction Mode*** | Face-to-Face |

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| **Grading Basis*** | Graded Only |

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| **Repeat Basis*** | May be taken only once |

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| **If it may be taken multiple times, limit on number of enrollments** | 1 |

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| **Cross Listed Course Subject Area and Catalog Nbr (if offered with another department)** | |
| **Dual Listed Course Subject Area and Catalog number (If offered as lower/upper division or ugrd/grad)** | |
| **Choose appropriate type(s) of course(s)** * | ☐ Major Course  ☐ Service Course  ☑ GE Course  ☐ None of the above |
| **General Education Area / Subarea** * | B4 |

**To view the General Education SubArea definitions, click http://www.cpp.edu/~academic-programs/scheduling/Documents/Ch.3-GeneralEducationProposals.pdf.**

## I. Catalog Description

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| **Catalog Description** | **This is the second semester of two in the Statistics with Applications stretch sequence that introduces the concepts of probability and basic descriptive statistics with requisite arithmetic and algebraic topics integrated throughout. This path is designed to serve students with majors that require no college-level mathematics beyond introductory freshman-level statistics. Students must take a year-long sequence to receive credit for college-level statistics. STA 1202 is focused mainly on the elementary probability theory and statistical inference. STA 1201 is a prerequisite for STA 1202. STA 1201 and STA 1202 together are equivalent to STA 1200. This sequence covers topics that include basic concepts of probability, discrete and continuous random variables, sampling distributions, introduction to statistical inference, confidence intervals for population means and proportions, hypothesis testing for population means and proportions, and correlation and regression model.**<br><br>**GE Area B4 credit is earned only by completing both STA 1201 and 1202.** |

## II. Required Coursework and Background

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| **Prerequisite(s)** | |

C or better in STA 1201 or consent of instructor

**Corequisite(s)**

**Pre or Corequisite(s)**

**Concurrent**

## III. Expected Outcomes

List the knowledge, skills, or abilities which students should possess upon completing the course. *

**Course Outcome: Students will be acquainted with the basic concepts of probability and statistical inference based on sample data, by meeting these Student Learning Outcomes:**

**Students should understand and be able to perform basic calculations from elementary probability, including probabilities related to binomial and normal random variable.**

**Students should understand how to calculate and draw real world conclusions from confidence intervals for**

**population means and proportions.**
**Students should understand how to calculate and draw**
**real world conclusions from hypothesis tests for**
**population means and proportions.**
**Students should be able to interpret the correlation**
**coefficient and regression coefficients.**
**Students should be able to construct confidence**
**intervals and perform hypothesis tests for the regression**
**slope.**

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| **If this is a course for the major, describe how these outcomes relate to the mission, goals and objectives of the major program.** | Not a major course |

**Explain how the course meets the description of the GE SubArea(s). Please select appropriate outcomes according to the GE Area/SLO mapping.**

The course description for subarea B4 is:

Courses in this area will require the student to use basic mathematical skills to develop mathematical reasoning, investigative and problem solving abilities, including applications from/to real life situations. Courses in this area will have an explicit intermediate algebra prerequisite, and students shall develop skills and understanding beyond the level of intermediate algebra. Students will not only practice computational skills, but will also be able to explain and apply basic mathematical concepts and solve problems using quantitative methods.

The Expected Outcomes for STA 1202 include outcomes related to basic mathematical skills (SLOs 1, 3, 5) to develop mathematical reasoning (SLOs 2,4), investigative and problem solving abilities (SLOs 2, 3, 4 ), including applications from/to real life situations (SLOs 2, 3). The prerequisite is as described and the material goes well beyond the level of intermediate algebra. Students will be required to express their answers in complete sentences, without coherent explanations of the problem-solving and interpretations of the mathematics.

**Describe how these outcomes relate to the associated GE Learning Outcomes listed below.***

The GE Learning Outcomes are achieved by the combination of courses STA 1201 and STA 1202. Area B4 credit is awarded upon completion of the two-course sequence. The table summarizes how the Student Learning Outcomes of both STA 1201 and STA 1202 correlate with the associated GE Learning Outcomes selected below:

| STA 1201 SLOs | Ia | Ie | IIa | IVb |
|---|---|---|---|---|
| O1 | X | | X | X |
| O2 | X | | | X |
| O3 | X | X | | X |
| O4 | X | X | X | X |
| O5 | X | X | X | X |

| STA 1202 SLOs | Ia | Ie | IIa | IVb |
|---|---|---|---|---|
| O1 | X | X | X | X |
| O2 | X |  | X | X |
| O3 | X |  | X | X |
| O4 | X | X | X | X |
| O5 | X | X | X | X |

**General Education Outcomes***

Ia. Write effectively for various audiences

Ie. Apply and communicate quantitative arguments using equations and graphical representations of data.

IIa. Apply scientific methods and models to draw quantitative and qualitative conclusions about the physical and natural world.

IVb. Demonstrate activities, techniques, or behaviors that promote intellectual or cultural growth.

**To view the mapping, click https://www.cpp.edu/~academic-programs/Documents /GE%20SLO%20Mapping.pdf**

## IV. Instructional Materials

**Provide bibliography that includes texts that may be used as the primary source for instruction, and other appropriate reference materials to be used in instruction. The reference list should be current, arranged alphabetically by author and the materials should be listed in accepted bibliographic form.**

**Instructional Materials***

**Texts may vary with instructor and over time. Examples of possible texts include: [Required] "*Understandable Statistics*," by Brase and Brase, 12th Edition, 2017, *Cengage Learnings*, ISBN: 978-0-470-44466-5.
[Recommended] "*Beginning and Intermediate Algebra*," by Sherri Messersmith, Third Edition, *McGraw Hill*, ISBN: 978-0-07-729699-5.**

**Faculty are encouraged to make all materials accessible. Indicate with an asterisk those items that have had accessibility (ATI/Section 508) reviewed. For more information, http://www.cpp.edu/~accessibility**

## V. Minimum Student Material

**List any materials, supplies, equipment, etc., which students must provide, such as notebooks, computers, internet access, special clothing or uniforms, safety equipment,**

**lockers, sports equipment, etc. Note that materials that require the assessment of a fee may not be included unless the fee has been approved according to University procedures.**

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| **Minimum Student Material\*** | Paper, pen or pencil, internet access, computer or access to computer lab, calculators may be required by some instructors |

## VI. Minimum College Facilities

**List the university facilities/equipment that will be required in order to offer this class, such as gymnastic equipment, special classroom, technological equipment, laboratories, etc.**

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| **Minimum College Facilities\*** | Classroom with standard computer, classroom projection system, whiteboard or chalkboard, and screen. |

## VII. Course Outline

**Describe specifically what will be included in the course content. This should not be a repetition of the course description but an expansion that provides information on specific material to be included in the class, e.g. lecture topics, skills to be taught, etc. This should not be a week-by-week guide unless all instructors are expected to follow that schedule.**

**Course Outline\***

I. Elementary Probability

Random experiments, outcomes, sample spaces, and events
Unions, intersections, complements, and their associated probability rules
Conditional probability and independence
Random variables, expected values, and variance
Binomial and normal distributions

II. Inferential Statistics

Sampling distributions of the sample mean and sample proportion
Point estimation versus interval estimation
Confidence intervals for population means (known and unknown variance cases) and population proportions
Null and alternative hypotheses, significance levels, and decisions/conclusions

One- and two-sided hypothesis tests for population means (known and unknown variance cases) and population proportions

III. Inferences on Regression Model

Review on the basics of correlation and simple linear regression
Computations and interpretations of correlation coefficient and regression coefficients
Prediction and extrapolation by a regression model
Confidence intervals and hypothesis tests for the correlation and the slope
(*if time permits*) Multiple linear regression

IV. Inferences on the Difference between Means or Proportions (*if time permits*)

Confidence intervals and hypothesis tests for the difference in two population means: independent samples and dependent samples
Confidence intervals and hypothesis tests for the difference in two population proportions

V. Analysis of Categorical Data (*if time permits*)

Concept of contingency tables
Chi-square test for the goodness of fit, independence, and homogeneity in a variety of contexts

## VIII. Instructional Methods

**Describe the type(s) of method(s) that are required or recommended for the instruction of this course (lectures, demonstrations, etc.). Include any method that is essential to the course, such as the use of particular tools or software.**

| Instructional Methods* | **Lecture, class discussion, and class activities (small group or individual) of topics. Hands-on use of the computer and class discussion of computer outputs.** |
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## IX. Evaluation of Outcomes

| **Describe the methods to be used to evaluate students' learning, i.e. written exams, term papers, projects, participation, quizzes, attendance, etc.*** | |
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Students will be evaluated on the basis of their performance on
(1) Assigned homework, (2) Class activities, and (3) Quizzes, midterm exams, and final examination.

**Describe the meaningful writing assignments to be included.** *

This course contains multiple assessments with a written component.  Clear writing is important in mathematics, as it is in any other field. Students are required to present their solutions in a clear and coherent form. Complete sentences are required, whether they be verbal or symbolic, and these sentences must be organized in such a fashion as to give a clear exposition of the problem. Feedback will be given throughout the quarter by the instructor.

**Discuss how these methods may be used to address the course and program outcomes, as appropriate. Include or attach a matrix to align the evaluation methods to the outcomes.** *

All methods will be used to evaluate all outcomes, with the exception of Outcome 1, which is primarily evaluated by Methods 1 and 3.

**If this is a general education course, discuss how these methods may be used to address the associated GE Learning Outcomes listed below. Include or attach a matrix to align the evaluation methods to the outcomes.** *

The matrix shows the alignment of evaluation methods to the GE Outcomes listed above.

|      | Homework | Activities | Quizzes, Exams |
|------|----------|------------|----------------|
| Ia   | X        | X          |                |
| Ie   | X        | X          | X              |
| IIa  | X        | X          | X              |
| IVb  | X        |            | X              |

**X.  This OPTIONAL Section is for describing Course/Department/College specific requirements**