Hawai'i Community College
Certification for General Education: Purpose, Criteria & Procedures
approved by GECTT, 2-27-12

Purpose

The purpose of GE certification at HawCC:

- ensures consistent implementation of HawCC's General Education Philosophy; and
- ensures that certified courses provide evidence of academic rigor and consistency with regard to the course outline--course objectives, student learning outcomes and course description—by meeting stated General Education Learning Outcome descriptors.

The purpose of the General Education Committee (GEC) is to review applications in order to designate courses to be part of HawCC's General Education curriculum.

Criteria for Certifying Courses for General Education

All HawCC courses that are certified as GE must: (#1 & #2 are from Sept. 23, 2011 Senate-approved, as amended, resolution)

1. have a primary designation and at least three secondary designations, one of which is Critical Thinking and one of which is Critical Reading.
   a. *Primary designation:*
      i. Courses numbered 100 or higher:
      Course learning outcomes and course objectives must support all descriptors of the primary designation except for those in the Communication (#1) and Areas of Knowledge (#7) Learning Outcomes. For those designations, all descriptors for a subcategory must be met. (amended by Senate, Jan. 27, 2012)
      ii. Courses numbered lower than 100:
      Course learning outcomes and course objectives must meet all those descriptors designated as essential on the HawCC General Education Student Learning Outcome Descriptors of the primary designation.
   b. *Secondary designations:*
      i. Critical Thinking:
      All certified courses must have at least one course learning outcome and course objective that supports a Critical Thinking descriptor or have evidence that the content taught relies on the use of at least one (1) Critical Thinking descriptor.
      ii. Critical Reading:
      All certified courses must have at least one course learning outcome and course objective that supports a Critical Reading descriptor or have evidence that the content taught relies on the use of at least one (1) Critical Reading descriptor.
      iii. In addition all certified courses must have at least one course learning outcome and course objective that supports at least one other GE learning outcome designation descriptor, i.e. not the primary designation or Critical Thinking or Critical Reading.
2. include rigorous reading, written, or quantitative assignments (as appropriate) that evaluate the student learning outcomes.

Procedures

1. Complete the HawCC Course Outline. Include in #8 (Course Topics) details in outline format
2. Complete Attachment A with the signatures of all tenure-track faculty in the discipline (ie, those who teach or may teach the subject). Signatures indicate support for course being submitted for GE certification.
3. Submit the Course Outline with Attachment A to the Chair, General Education Committee
4. See the Signature Page of Attachment A (Section H.) for additional instructions.

University of Hawai'i – Hawai'i Community College
Course Outline

MATH	115	STATISTICS
course alpha	course number	course title

1. Course Description:

Presents basic introduction to topics in statistics including: descriptive statistics, elementary probability theory, normal and binomial distributions, methods of statistical inference. Emphasis on interpretation and applications.

2. Number of Credit Hours: 3

3. Course Prerequisites and Concurrency: (Please check the box if the prerequisite may also be taken in the same semester as the proposed course.)

		May be taken concurrently
a.	"C" or better in Math 27 or placement in Math 110 or higher	☐
b.	"C" or better in Eng 21 or Eng 22 or ESL 15 or placement in Eng 102 or placement in Eng 100	☐
c.		☐
d.		☐

4. Course Corequisites: (Course that must be taken in the same semester as the proposed course.)

a.	

5. Recommended Preparation:

6. Student Learning Outcomes:

a.	1. Use descriptive methods of statistics for the purpose of organizing and summarizing data. 2. Use methods of inferential statistics to interpret data for the purposes of decision.

7. Course Objectives

a.

1. Derive and interpret the meaning of summary measures: mean, median, mode, variance, standard deviation, quartile, percentile, range, minimum, maximum, outlier, etc..) within the context of a data set/problem.
   - Describe position and outliers relative to a data set
   - Calculate measures of central tendency
   - Calculate positional measures
   - Calculate measures of dispersion
2. Interpret data presented graphically
3. Organize and present data using frequency and relative frequency distributions and graphs
4. Recognize graphical misrepresentation of data.
5. Use technology to organize and summarize large data sets.
6. Demonstrate counting techniques, e.g. multiplication property, permutations with distinct and non-distinct items, combinations
7. Calculate probability using empirical versus classical methods.
8. Construct sample space in order to find the probabilities of a given simple event or compound events, e.g. independent, mutually exclusive, conditional events.
9. Calculate probabilities of compound events using the Addition Rule and the Multiplication Rule
10. Calculate probabilities of independent events, mutually exclusive events and conditional events
11. Quantify the shape, center, and spread of the distribution based on key characteristics of a distribution.
12. Calculate probabilities involving binomial, uniform, and normal distributed random variables.
13. Use key characteristics of a distribution to quantify the shape, center, and spread of the distribution
14. Compute normal distributions and sampling distributions of the mean
15. Identify a random variable as discrete or continuous
16. Execute appropriate statistical procedures and write sound interpretations for use in practical decision-making
17. Make random selections of data and simulate experiments
18. Recognize and create appropriate sampling technique
19. State the hypothesis and alternative hypothesis
20. Identify rationale for the level of significance selected (consequence of Type I or Type II errors) in the decision making process
21. Test hypotheses using p-value and t-statistics
22. Use standard normal distribution to make inferences about normally distributed samples and populations
23. Compute normal distributions and sampling distributions of the mean
24. Find and interpret in writing confidence intervals where population mean and standard deviation are known, unknown, and using population proportion
25. Use confidence intervals to estimate and measure the accuracy of means and proportions.
26. Use tables and technology to compute area and probability associated with random variables having normal distribution
27. Utilize the relationship between normal random variable and standard normal variable to draw conclusions regarding probability.

8. Course Topics:

a.

I. Overview: Definitions of terminology
- A. Descriptive and inferential statistics
- B. Variables: qualitative, quantitative (continuous and discrete)
- C. Samples
- D. Data types

II. Organization of Data: graphic representation
- A. Organizing data – frequency distributions
- B. Graphic representation of data: histograms, stem and leaf plots, line graphs, etc.

III. Descriptive Statistics
- A. Measures of central tendency: population and sample mean, median and mode
- B. Measures of variation: population and sample
- C. Measures of position: relative to mean and standard deviation

IV. Descriptive Statistics for grouped Data
- A. Measures of Central Tendency: Mean, Median and Mode
- B. Measures of Variation

V. Counting Techniques
- A. Multiplication/addition rules and the use of complements
- B. Permutations with distinct and non-distinct objects
- C. Combinations

VI. Probability
- A. Overview – probability and statistics: empirical and Classical methods
- B. Identify samples spaces
- C. Basic properties of probability
- D. Addition principle for disjoint, non-disjoint and independent, dependent events
- E. Multiplication principle for disjoint, non-disjoint and independent, dependent events
- F. Independent vs. dependent, mutually exclusive events
- G. Conditional probabilities

VII. Probability Distributions
- A. Terminology
- B. Mean, variance, and standard deviation of a probability distribution
- C. Expectation
- D. Binomial distribution

VIII. Sampling techniques
- A. Proper data collection
- B. Bias in sampling

IX. Normal distribution
- A. Properties of a normal distribution
- B. Standard normal distribution (relationship between Normal Distribution and Standard Normal Distribution)
- C. Central Limit theorem

X. Hypotheses testing
- A. Mechanics of hypotheses testing and limits of interpretation
- B. Standard Normal z and students-t tests

XI. Applications of hypotheses testing
- A. Testing differences between means
- B. Testing differences between proportions

XII. Estimation of population parameters/confidence intervals
- A. Estimation of population mean – sample size
- B. Estimation of population proportion – sample size
- C. Estimation of population variance (if time permits)

Attachment A, Part I: HawCC Criteria for Transfer Courses
for the A.A. and A.S. Degrees only

CRITERIA FOR TRANSFER COURSES (Attach. III/IV, *CCCM 6100*)
Final decisions as to the academic level of a course should generally rest with the professional judgment of the faculty. Each of the items below indicates an area which should be considered in arriving at this judgment, although not all items pertain to all courses. It is important that judgments not be made by the "least common denominator" approach: the standard to keep in mind is the "typical" college transfer course, rather than the most borderline courses now accepted within the system.

1. Rate of progress expected of students.
High schools and colleges typically differ rather substantially in the quantity of material taught in a semester. The course in question should be compared with high school and college courses in related areas.

2. Basic skills (reading, writing and analytical) needed for success in the course.
The concern here is with the skill levels required of students rather than the level of material in the class. To be successful in most freshman transfer courses, a student must have a minimum of 10th grade skill level in the areas relevant to the course.

3. Amount and level of reading, writing or other independent work required.
As a rule of thumb, much of the reading material for a freshman level course should be at 12th or 13th grade level. Sometimes sophisticated ideas are presented in a simple writing style (such as the writing of Campus). In these cases, the level of the audience for which the materials were developed or who normally read them may be a useful indicator.

College courses usually differ from high school courses in the amount of reading, writing or other independent work required of students. The long standing rule of thumb for lecture classes is that students should spend two hours studying outside of class for every hour in class. For laboratory classes, a rule of thumb is that the student should spend three hours per week for each credit assigned to the class, with the student working independently or in groups for a substantial portion of the lab.

4. Amount and level of quantitative and logical reasoning required.
Where the course involves use of mathematics, a minimum of one year of high school algebra, or its equivalent, as background for the course would be required for transfer courses, (In the field of mathematics itself, courses through second year algebra are non-transfer.) Courses should also be examined for use of logical principles.

5. Conceptual level of the course.
Transfer courses generally stress theory, principles and concepts more than do non-transfer courses. They also move at least somewhat beyond recognition, recall and application to synthesis, analysis and understanding, although a major goal of many introductory transfer courses is mastery of the basic language and concepts of the discipline. Where a course focuses on teaching specific skills, it may be transfer level if it emphasizes the skills as applications of basic underlying principles and devotes considerable attention to understanding of those principles.

6. Background knowledge in related subject matter expected of students entering the course.
If a course is based on the expectation that-students will have completed normal high school courses in related areas it may be a transfer course (e.g,, high school physics as an expected preparation for a technical program). If the course has as a prerequisite, another course, which is itself transferable, and if the knowledge from the prior course is utilized in the course in question, the course should be transferable.

7. Level of mastery expected of students.
When the competencies attained in a course are sufficient to prepare students for further study in a related baccalaureate program, the course may be transferable. The relationship between the subject matter of the course and any related baccalaureate program area should be examined.

8. Is there a counter-part to this course on any four-year campus in the University system?
Although generally a course taught on four-year campuses would automatically be numbered 100 or above, it should be examined against other criteria as well. It is possible that some courses offered on four-year campuses should not be there. If such a case arises, we should challenge the appropriateness of that course on the four-year campus rather than blindly following their lead.

9. Is this course taught at or accepted by major accredited mainland colleges or Universities?
As in #8, the course should be examined against other criteria as well. Practice elsewhere is not sufficient justification for our numbering decisions.

Hawai'i Community College
Attachment A, Part II:
Form to be Submitted for General Education Certification
of Courses for the A.A. and A.S. Degrees only

A. MATH (course alpha) | 115 (course number) | STATISTICS (course title)

B. Effective semester & year for entering students (ie, semester & year of implementation): FALL 2013

C. General Education Student Learning Outcome being sought as the Primary Designation. All descriptors within a GELO must be supported.

Select: 6. Quantitative Reasoning

D. Based on the General Education Student Learning Outcome selected in C. (Primary Designation), list the specific course objectives and any relevant course student learning outcomes that support each of the descriptors in this GELO.

GE Student Learning Outcome Descriptors	Course Objectives (may provide supporting explanation as needed, after each one)	Course student learning outcomes (provide all that support the GELO descriptor)
Quantitative Reasoning - Apply mathematical concepts, methods, and problem-solving strategies to analyze, synthesize, and evaluate real-world problems in quantitative terms enables a student to...		
a. use appropriate modeling strategies to solve real-world problems arithmetically.	1. Derive and interpret the meaning of summary measures: mean, median, mode, variance, standard deviation, quartile, percentile, range, minimum, maximum, outlier, etc..) within the context of a data set/problem. 6. Demonstrate counting techniques, e.g. multiplication property, permutations with distinct and non-distinct items, combinations 7. Calculate probability using empirical versus classical methods. 9. Calculate probabilities of compound events using the Addition Rule and the Multiplication Rule. 10. Calculate probabilities of independent events, mutually exclusive events and conditional events 12. Calculate probabilities involving binomial, uniform, and normal distributed random variables.	1. Use descriptive methods of statistics for the purpose of organizing and summarizing data.

b. use appropriate modeling strategies, which include algebraic, statistical, estimation, inductive and/or deductive reasoning techniques.	1. Derive and interpret the meaning of summary measures: mean, median, mode, variance, standard deviation, quartile, percentile, range, minimum, maximum, outlier, etc..) within the context of a data set/problem.. 8. Construct sample space in order to find the probabilities of a given simple event or compound events, e.g. independent, mutually exclusive, conditional events 10. Calculate probabilities of independent events, mutually exclusive events and conditional events 21. Test hypotheses using p-value and t-statistics 23. Compute normal distributions and sampling distributions of the mean 25. Use confidence intervals to estimate and measure the accuracy of means and proportions.	1. Use descriptive methods of statistics for the purpose of organizing and summarizing data. 2. Use methods of inferential statistics to interpret data for the purposes of decision.
c. interpret mathematical models such as formulas, graphs, tables, and schematics, and draw inferences from them. .	1. Derive and interpret the meaning of summary measures: mean, median, mode, variance, standard deviation, quartile, percentile, range, minimum, maximum, outlier, etc..) within the context of a data set/problem. 2. Interpret data presented graphically 3. Organize and present data using frequency and relative frequency distributions and graphs 16. Execute appropriate statistical procedures and write sound interpretations for use in practical decision-making 20. Identify rationale for the level of significance selected (consequence of Type I or Type II errors) in the decision making process 21. Test hypotheses using p-value and t-statistic 22. Use standard normal distribution to make inferences about normally distributed samples and populations	1. Use descriptive methods of statistics for the purpose of organizing and summarizing data. 2. Use methods of inferential statistics to interpret data for the purposes of decision.

d. use symbols to express abstractions and manipulate symbols within a logical system.	1. Derive and interpret the meaning of summary measures: mean, median, mode, variance, standard deviation, quartile, percentile, range, minimum, maximum, outlier, etc..) within the context of a data set/problem. 8. Construct sample space in order to find the probabilities of a given simple event or compound events, e.g. independent, mutually exclusive, conditional events. 21. Test hypotheses using p-value and t-statistics	2. Use methods of inferential statistics to interpret data for the purposes of decision.
e. represent mathematical information symbolically, visually, numerically, and verbally.	1. Derive and interpret the meaning of summary measures: mean, median, mode, variance, standard deviation, quartile, percentile, range, minimum, maximum, outlier, etc..) within the context of a data set/problem. 2. Interpret data presented graphically 3. Organize and present data using frequency and relative frequency distributions and graphs	1. Use descriptive methods of statistics for the purpose of organizing and summarizing data.

f. estimate and check answers to mathematical problems in order to determine reasonableness, identify alternatives, and select optimal results.	1. Derive and interpret the meaning of summary measures: mean, median, mode, variance, standard deviation, quartile, percentile, range, minimum, maximum, outlier, etc..) within the context of a data set/problem. 2. Interpret data presented graphically 4. Recognize graphical misrepresentation of data 6. Demonstrate counting techniques, e.g. multiplication property, permutations with distinct and non-distinct items, combinations 11. Quantify the shape, center, and spread of the distribution based on key characteristics of a distribution. 16. Execute appropriate statistical procedures and write sound interpretations for use in practical decision-making	1. Use descriptive methods of statistics for the purpose of organizing and summarizing data. 2. Use methods of inferential statistics to interpret data for the purposes of decision.

E. Textbook(s) and/or other written material (can include electronic material):

a. List the textbook(s) and/or other written material to be used. (If no textbook is use, so state.) Indicate approximate portion of text to be used, if less than 75%.

"Fundamentals of Statistics" Ed. 3
Sullivan, Micheal ; Prentice Hall

b. Identify grade level of textbook(s) and/or other written material. Publishers can provide grade level for textbooks.

Reading LEVEL????

F. List specific rigorous assignments/activities that are commonly required to evaluate student learning for all sections taught of this course. Identify the category by marking X in all that apply--*reading, writing, quantitative, or a combination*. HawCC uses the following to define academic rigor:

- **Reading**--Provide a description of rigorous student engagement in the critical reading process. For example: quantify number of pages or percentage of textbook read (written at 12th/13th grade level), provide the number of scholarly articles read (with a minimum of 5 bibliographic references per article), or describe the nature and length of other assigned readings.
- **Writing**--Provide a description of rigorous student engagement in the writing process. For example: give the number of pages written over the semester or describe the nature of the paper--research, observation, journal, etc.
- Q**uantitative reasoning**-- Provide a description of rigorous student engagement in the quantitative reasoning process. For example: provide the number and nature of mathematical problems (at least above one year of high school algebra); describe the extent and nature of data collection and analysis or mapping projects.

Describe assignments/activities that show rigorous student engagement--include assignments/activities of same type in one row—(mark X for all that apply—reading, writing, quantitative):	Reading	Writing	Quantitative
Provide descriptive statistics for small and large data sets involving calculation of measures of central tendency, dispersion and providing graphical representation; make inferences about populations based on statistics	☐	☐	☒
	☐	☐	☐
Enter text.	☐	☐	☐
Enter text.	☐	☐	☐

G. Secondary Designations:

- For the first of 3 required General Student Learning Outcome designations--critical reading--select at least one descriptor that the course supports, copy it into the table below and include either a supporting course objective and supporting course student learning outcome, or content evidence.

e. use appropriate reading techniques depending on the material and purpose.

Critical Reading - Read critically to synthesize information to gain understanding enables a student to...

e. use appropriate reading techniques depending on the material and purpose.

Supporting Course objective and Supporting Course SLO:

2. Interpret data presented graphically

4. Recognize graphical misrepresentation of data.

16. Execute appropriate statistical procedures and write sound interpretations for use in practical decision-making

20. Identify rationale for the level of significance selected (consequence of Type I or Type II errors) in the decision making process

1. Use descriptive methods of statistics for the purpose of organizing and summarizing data.
2. Use methods of inferential statistics to interpret data for the purposes of decision.

OR Content evidence (i.e., assignments/activities)

Enter Text

- For the second of 3 required General Student Learning Outcome designations--critical thinking-- select at least one descriptor that the course supports, copy it into the table below and include either a supporting course objective and supporting course student learning outcome, or content evidence.

f. apply problem-solving techniques and skills, including the rules of logic and logical sequence.

Critical Thinking - Make informed decisions through analyzing and evaluating information enables a student to...

f. apply problem-solving techniques and skills, including the rules of logic and logical sequence.

Supporting Course objective and Supporting Course SLO:

4. Recognize graphical misrepresentation of data.

16. Execute appropriate statistical procedures and write sound interpretations for use in practical decision-making

20. Identify rationale for the level of significance selected (consequence of Type I or Type II errors) in the decision making process

1. Use descriptive methods of statistics for the purpose of organizing and summarizing data.

2. Use methods of inferential statistics to interpret data for the purposes of decision.

OR Content evidence (i.e., assignments/activities)

Enter Text

- For the third of 3 required General Student Learning Outcome designations—anything other than the primary designation, critical reading and critical thinking—select at least one descriptor that the course supports, copy it into the table below and either a supporting course objective and supporting course student learning outcome, or content evidence.

5. Technological Literacy

Technological Literacy - Employ computer technology to perform academic and professional tasks enables a student to...

a. demonstrate proficiency in using computer software such as that used for word processing, spreadsheets and presentations.
b. apply knowledge of security, ethical, and legal standards while using technology.
c. use communication technologies such as e-mail, discussion boards and video-conferencing.
d. use basic terminology associated with technology.

Supporting Course objective and Supporting Course SLO:

a. demonstrate proficiency in using computer software such as that used for word processing, spreadsheets and presentations.

Course Objectives: 5. Use technology to organize and summarize large data sets.

1. Use descriptive methods of statistics for the purpose of organizing and summarizing data.

OR Content evidence (i.e., assignments/activities)

Technology employed for calculations of descriptive statistics for large data sets.

- Optional--additional secondary designations beyond the required 3 may be chosen. Please write in the additional General Education Learning Outcome, the descriptor and the supporting evidence for each.

Enter text.