Arizona State University Criteria Checklist for

MATHEMATICAL STUDIES [CS]

Rationale and Objectives

The **Mathematical Studies** requirement is intended to ensure that students have skill in basic mathematics, can use mathematical analysis in their chosen fields, and can understand how computers can make mathematical analysis more powerful and efficient. The **Mathematical Studies** requirement is completed by satisfying both the **Mathematics [MA]** requirement and the **Computer/Statistics/Quantitative Applications [CS]** requirement explained below.

The **Mathematics [MA]** requirement, which ensures the acquisition of essential skill in basic mathematics, requires the student to complete a course in College Mathematics, College Algebra, or Pre-calculus; or demonstrate a higher level of skill by completing a mathematics course for which a course in the above three categories is a prerequisite.

The **Computer/Statistics/Quantitative Applications [CS]** requirement, which ensures skill in real world problem solving and analysis, requires the student to complete a course that uses some combination of computers, statistics, and/or mathematics.* Computer usage is encouraged but not required in statistics and quantitative applications courses. At a minimum, such courses should include multiple demonstrations of how computers can be used to perform the analyses more efficiently.

*CS does *not* stand for computer science in this context; the "S" stands for statistics. Courses in computer science must meet the criteria stated for CS courses.

Revised April 2014

Proposer: Please complete the following section and attach appropriate documentation.

<table>
<tr><td colspan="4" align="center">**ASU--[CS] CRITERIA**</td></tr>
<tr><td colspan="4" align="center">**A COMPUTER/STATISTICS/QUANTITATIVE APPLICATIONS [CS] COURSE MUST SATISFY ONE OF THE FOLLOWING CRITERIA: 1, 2, OR 3**</td></tr>
<tr><td>**YES**</td><td>**NO**</td><td></td><td>**Identify Documentation Submitted**</td></tr>
<tr><td></td><td></td><td>**1. Computer applications*:** courses must satisfy both **a** and **b**:</td><td></td></tr>
<tr><td>☐</td><td>☐</td><td>**a.** Course involves the use of computer programming languages or software programs for quantitative analysis, algorithmic design, modeling, simulation, animation, or statistics.</td><td></td></tr>
<tr><td></td><td></td><td>**b.** Course requires students to analyze and implement procedures that are applicable to at least one of the following problem domains **(check those applicable)**:</td><td></td></tr>
<tr><td>☐</td><td>☐</td><td>i.   Spreadsheet analysis, systems analysis and design, and decision support systems.</td><td></td></tr>
<tr><td>☐</td><td>☐</td><td>ii.   Graphic/artistic design using computers.</td><td></td></tr>
<tr><td>☐</td><td>☐</td><td>iii.   Music design using computer software.</td><td></td></tr>
<tr><td>☐</td><td>☐</td><td>iv.   Modeling, making extensive use of computer simulation.</td><td></td></tr>
<tr><td>☐</td><td>☐</td><td>v.   Statistics studies stressing the use of computer software.</td><td></td></tr>
<tr><td>☐</td><td>☐</td><td>vi.   Algorithmic design and computational thinking.</td><td></td></tr>
<tr><td colspan="4">*The **computer applications** requirement **cannot** be satisfied by a course, the content of which is restricted primarily to word processing or report preparation skills, the study of the social impact of computers, or methodologies to select software packages for specific applications. Courses that emphasize the use of a computer software package are acceptable only if students are required to understand, at an appropriate level, the theoretical principles embodied in the operation of the software and are required to construct, test, and implement procedures that use the software to accomplish tasks in the applicable problem domains. Courses that involve the learning of a computer programming language are acceptable only if they also include a substantial introduction to applications to one of the listed problem domains.</td></tr>
</table>

YES	NO		Identify Documentation Submitted
		2. Statistical applications: courses must satisfy **a**, **b,** and **c**.	
☐	☐	**a.** Course has a minimum mathematical prerequisite of College Mathematics, College Algebra, or Pre-calculus**,** or a course already approved as satisfying the MA requirement.	
		b. The course must be focused principally on developing knowledge in statistical inference and include coverage of all of the following:	
☐	☐	i. Design of a statistical study.	
☐	☐	ii. Summarization and interpretation of data.	
☐	☐	iii. Methods of sampling.	
☐	☐	iv. Standard probability models.	
☐	☐	v. Statistical estimation	
☐	☐	vi. Hypothesis testing.	
☐	☐	vii. Regression or correlation analysis.	
☐	☐	**c.** The course must include multiple demonstrations of how computers can be used to perform statistical analysis more efficiently, if use of computers to carry out the analysis is not required. .	

YES	NO		Identify Documentation Submitted
		3. Quantitative applications: courses must satisfy **a**, **b, and c:**.	
☐	☐	**a.** Course has a minimum mathematical prerequisite of College Mathematics, College Algebra, or Pre-calculus**,** or a course already approved as satisfying the MA requirement.	
		b. The course must be focused principally on the use of mathematical models in quantitative analysis and decision making. Examples of such models are:	
☐	☐	i. Linear programming.	
☐	☐	ii. Goal programming.	
☐	☐	iii. Integer programming.	
☐	☐	iv. Inventory models.	
☐	☐	v. Decision theory.	
☐	☐	vi. Simulation and Monte Carlo methods.	
☐	☐	vii. Other (explanation must be attached).	
☐	☐	**c.** The course must include multiple demonstrations of how computers can be used to perform the above applications more efficiently, if use of computers is not required by students.	

Course Prefix	Number	Title	General Studies Designation

Explain in detail which student activities correspond to the specific designation criteria. Please use the following organizer to explain how the criteria are being met.

Criteria (from checksheet)	How course meets spirit (contextualize specific examples in next column)	Please provide detailed evidence of how course meets criteria (i.e., where in syllabus)