

PENNSYLVANIA STATEWIDE PROGRAM-TO-PROGRAM ARTICULATION AGREEMENT IN BUSINESS

In accordance with Act 50 of 2009, this Agreement ensures that a student who successfully completes an Associate of Arts (AA) or Associate of Science (AS) degree at an institution participating in the Commonwealth's statewide college credit transfer system can transfer the full degree into a parallel bachelor degree program in Business at another participating college or university.

Full junior-standing will be granted to students who have successfully completed an AA or AS degree provided that:

- The associate degree includes all of the required major competencies identified in this Agreement.
- The associate degree includes at least 24 credits of Major-Specific Content and at least 6 credits of Major-Related Coursework as detailed in this Agreement.

See Appendix A: Major Requirements for Program-to-Program Articulation in Business.

Students meeting these criteria will be considered by participating bachelor degree granting institutions to have received adequate preparation for transfer with junior standing into a parallel bachelor degree in Business and to be eligible to enter advanced coursework in the field of study.

OVERVIEW

Accreditation in higher education is not a new concept. In fact, accreditation has been around for more than a century in many parts of the world. Accreditation is a voluntary, non-governmental process that includes an external review of a school's ability to provide quality programs. It is helpful in many aspects, from ensuring that students are learning relevant material to allowing a school access to funding. Accreditation reviews include self-evaluations, peer-reviews, committee-reviews, and the development of in-depth strategic plans. They also include reviews of a school's mission, faculty qualifications, and curricula.

The Council for Higher Education Accreditation (CHEA) (www.chea.org) recognizes AACSB International – The Association to Advance Collegiate Schools of Business as the accrediting entity for collegiate programs of Business Administration and Accounting. AACSB provides colleges and universities with a set of common standards for developing undergraduate and graduate-level degree programs in Business Administration and Accounting to address the special needs of the profession. The AACSB Accreditation Standards are used as the basis to evaluate an institution's mission, operations, faculty qualifications and contributions, programs, and other critical areas.

The AACSB Accreditation Standards were first adopted in 1919. Throughout the years, the standards have continued to be revised to ensure quality and continuous improvement in collegiate business education. In 2010, the AACSB Accreditation Standards were again revised, as well as the surrounding processes and documentation requirements.

AACSB considers the following as "traditional business subjects": Accounting, Business Law, Decision Sciences, Finance (including Insurance, Real Estate, and Banking), Human Resources, Management, Management Information Systems, Management Science, Marketing, Operations Management, Organizational Behavior, Organizational Development, Strategic Management, Supply Chain Management (including Transportation and Logistics), and Technology Management. This list is not intended to be exhaustive. Normally, extensions of the "traditional business subjects", including

interdisciplinary, integrated courses, majors, programs, concentrations, or areas of emphasis, will be included in the scope of AACSB accreditation as well.

The CHEA also recognizes ACBSP – Accreditation Council for Business Schools and Programs as another accrediting entity for collegiate programs of Business Administration and Accounting. ACBSP accreditation standards are modeled on the Baldrige National Quality Program, the same standards as those used by businesses, health care providers, and others to recognize excellence and commitment for continuous improvement. “The association embraces the virtues of teaching excellence and emphasizes to students that it is essential to learn how to learn” (www.acbsp.org). Standards adopted by ACBSP that are required for initial accreditation and reaffirmation assure that students who transfer would be provided a level of education that would be comparable to the same courses taught at a four year institution.

The third accreditation body recognized by the CHEA is: International Assembly for Collegiate Business Education (IACBE). Similar to the other two accreditation agencies, IACBE “provide[s] external assurance of quality in an institution’s business programs.” The concept of continuous quality improvement is central to the IACBE accreditation process. Philosophically, the accreditation process of IACBE is governed by its mission-driven and outcomes-based focus, where “the assurance of academic quality is based on the results of the assessment of educational outcomes rather than prescriptive input standards.”

Student learning is the central activity of higher education. Definition of learning expectations and assurance that graduates achieve learning expectations are key features of any academic program. The learning expectations derive from a balance of internal and external contributions to the definition of educational goals. Members of the business community, students, and faculty members each contribute valuable perspectives on the needs of graduates. Learning goals should be set and revised at a level that encourages continuous improvement in educational programs.

Colleges and universities use a variety of structures and approaches to provide learning experiences for students. Programs exist at a variety of academic levels and for a variety of purposes. AACSB uses the following general definition to describe learning expectations at the undergraduate bachelor degree level.

“Undergraduate degree programs (bachelor’s level) in business educate students in a broad range of knowledge and skills as a basis for careers in business. Learning expectations build on the students’ pre-collegiate educations to prepare students to enter and sustain careers in the business world and to contribute positively in the larger society. Students achieve knowledge and skills for successful performance in a complex environment requiring intellectual ability to organize work, make and communicate sound decisions, and react successfully to unanticipated events. Students develop learning abilities suitable to continue higher-level intellectual development.”

Many bachelor-degree granting institutions in Pennsylvania’s college credit transfer system have AACSB and/or ACBSP accredited programs. Therefore, the following Agreement has been designed to provide students with the foundation-level knowledge in the field of study while also respecting the accreditation standards of the bachelor degree programs offered at many of the colleges and universities where the students will transfer.

REQUIRED MAJOR-SPECIFIC CONTENT

An associate degree transferable under this Agreement must include at least 24 credits of Major-Specific coursework that incorporates all of the competencies identified in the following six broad content areas.

- 1. Computer Literacy – 3 credits**
- 2. Accounting – 6 credits**
 - **Financial Accounting – 3 credits**
 - **Managerial Accounting – 3 credits**
- 3. Legal Environment and Business – 3 credits**
- 4. Principles of Management – 3 credits**
- 5. Principles of Marketing – 3 credits**
- 6. Principles of Economics – 6 credits**

See Appendix A: Major Requirements for Program-to-Program Articulation in Business.

This agreement acknowledges that, depending upon how an institution chooses to deliver the content competencies, an institution may offer an associate degree that includes more than the minimum 24 credits. For example, one institution may embed required competencies in Financial Accounting in a 3-credit course, while another institution may embed those competencies in a 4-credit course. The specific course structure is not as important as making sure that upon completion of the associate's degree, the student has achieved the competencies included in this agreement and is prepared to enter advanced coursework as a junior in the parallel major at a participating bachelor-degree institution.

1. Computer Literacy – 3 credits

Coursework in this content area will develop a student's knowledge of:

1. Microcomputer components, selected application software, an operating system, and electronic communication techniques.
2. Word processing software for document development for college and workplace requirements.
3. Spreadsheet software for worksheet development for college and workplace requirements.
4. Database software for data organization, retrieval, and reporting.
5. World Wide Web for information retrieval and communication for college and workplace requirements.

Upon successfully completing this coursework, students will be able to:

1. Login to a network and use Windows graphical user interface to access computer resources.
2. Create an organized structure of folders and manage documents, saving them to an electronic medium using a previously created directory structure.
3. Use email to: login to email account, create and send email, receive, read, save a message in a folder, attach a file, and create a personal signature.
4. Review and perform basic text enhancing with Microsoft Word.
5. Perform document formatting options with Microsoft Word: margins, orientation, page breaks, page numbers, headers and footers, cover page, find & replace, spelling and grammar, save, save as, print.
6. Perform advanced formatting with Microsoft Word: paragraph line spacing, indents, tabs, borders, lists, columns; styles; tables of contents and indexing.
7. Create, format, and use tables and graphics with Microsoft Word.
8. Use Microsoft Word to collaborate, create a bibliography, add reference resources, and merge files.
9. Design, create, edit, format, and print spreadsheets using Microsoft Excel.
10. Create formulas and use functions for calculation of cell contents in Microsoft Excel spreadsheets.
11. Define and use relative and absolute cell references.
12. Define, create, and print graphs that include titles, legends, borders, color.
13. Sort, filter, and subtotal data converted to data tables in Microsoft Excel.
14. Use a Microsoft Word document as the basis for copying and pasting objects from Microsoft Excel.

15. Create a database to store data.
16. Construct queries and report forms to extract specific information from a database.

2. Accounting – Total of 6 credits as defined below

a. Financial Accounting – 3 credits

Students who complete coursework in this content area will be able to:

1. Describe a chart of accounts and its use in the accounting process.
2. Record business events using the accounting equation.
3. Make year- end adjustments to recognize accrued and deferred revenues and expenses.
4. Discuss the primary components of corporate governance.
5. Record and report on inventory transactions using a perpetual and periodic inventory system.
6. Explain how gains and losses differ from revenues and expenses.
7. Compare and contrast single and multi-step income statements.
8. Determine the amount of net sales and net purchases (discounts, returns, and allowances).
9. Determine the amount of cost of goods sold and ending inventory using the FIFO, LIFO, weighted average, and specific identification cost flow methods.
10. Apply the lower- of- cost- or- market rule to inventory valuation.
11. Use the gross margin method to estimate ending inventory.
12. Identify the key elements of a strong system of internal control and special internal controls for cash.
13. Prepare a bank reconciliation.
14. Explain the use of a petty cash fund.
15. Explain the allowance method of accounting for uncollectible accounts and how the method affects financial statements.
16. Estimate uncollectible accounts expense using the percent of revenue method and the percent of receivables method.
17. Show how the direct write- off method of accounting for uncollectible accounts affects financial statements.
18. Account for notes receivable, notes payable and accrued interest.
19. Explain how accounting for credit card sales affects financial statements.
20. Determine how to record the acquisition and the allocation of costs of long- term operational assets.
21. Determine book value and explain how gains and losses on disposals of long- term operational assets affect financial statements.
22. Show how revising estimates and continuing expenditures for operational assets affect financial statements.
23. Explain how expense recognition for natural resources (depletion) and intangible assets (amortization) affects financial statements.
24. Illustrate how warranty obligations affect financial statements.
25. Determine payroll taxes and explain how they affect financial statements.
26. Describe bond features and show how the issuance of bonds effect financial statements.
27. Use the straight- line and effective interest methods to amortize bond discounts and premiums.
28. Identify the primary characteristics of sole proprietorships, partnerships, and corporations.
29. Explain different types of capital stock and show how the stock affects financial statements.
30. Explain how dividends, stock splits, stock dividends, and appropriations affect financial statements.
31. Prepare a financial statement analysis including horizontal and vertical analyses and ratios to assess a company's liquidity, solvency, management's effectiveness, and a company's position in the stock market.
32. Record transactions using the general journal format and show their effect on financial statements.
33. Identify and prepare 1) an unadjusted trial balance, 2) an adjusted trial balance, and 3) a post-closing trial balance and explain how they are used to prepare financial statements.

34. Use general ledger account information to prepare and interpret the balance sheet, income statement, statement of changes in owners' equity, and the statement of cash flow (indirect and direct methods).

b. Managerial Accounting – 3 credits

Students who complete coursework in this content area will be able to:

1. Distinguish between managerial and financial accounting.
2. Identify the cost components of a product made by a manufacturing company: the cost of materials, labor, and overhead.
3. Show how just- in- time inventory can increase profitability.
4. Identify the key components of corporate governance.
5. Identify and describe fixed, variable, and mixed cost behavior.
6. Demonstrate the effects of operating leverage on profitability.
7. Prepare an income statement using the contribution margin approach.
8. Demonstrate how the relevant range and decision context affect cost behavior.
9. Use the high- low method, scatter graphs, and regression analysis to estimate fixed and variable costs.
10. Use the equation method, the contribution margin per unit, and contribution margin ratio methods to determine the break- even point.
11. Set selling prices by using cost- plus, prestige, and target costing.
12. Explain cost- volume- profit relationships and draw and interpret a cost- volume- profit graph.
13. Calculate and interpret the margin of safety.
14. Identify cost objects and cost drivers.
15. Select appropriate cost drivers and demonstrate the allocation of indirect costs.
16. Explain the benefits and detriments of allocating pooled costs.
17. Allocate joint product costs.
18. Allocate service department costs to operating departments.
19. Use activity- based costing to calculate costs of products and services.
20. Identify the components of quality costs; prepare and interpret quality cost reports.
21. Identify the characteristics of relevant information.
22. Distinguish between unit- level, batch- level, product- level, and facility- level costs and understand how these costs affect decision making.
23. Make appropriate special order and outsourcing decisions.
24. Make appropriate segment elimination and asset replacement decisions.
25. Prepare a sales budget and related schedule of cash receipts.
26. Prepare a schedule of cash payments for inventory purchases budget and selling and administrative expense budget.
27. Prepare a cash budget.
28. Prepare a pro forma income statement, balance sheet, and statement of cash flows.
29. Describe flexible and static budgets.
30. Classify variances as being favorable or unfavorable.
31. Compute and interpret sales and variable cost volume variances.
32. Compute and interpret flexible budget variances, fixed cost variances, and price and usage variances.
33. Describe the differences among cost, profit, and investment centers.
34. Relate management by exception to responsibility reports.
35. Determine and interpret the net present value and the internal rate of return of an investment opportunity.
36. Evaluate capital investment opportunities using cash payback and unadjusted rate of return alternatives.
37. Demonstrate the flow of materials, labor costs, and estimated overhead costs for inventory and cost of goods sold for a manufacturing company.
38. Prepare a schedule of cost of goods manufactured and sold.
39. Prepare financial statements for a manufacturing company.

40. Distinguish between absorption, variable costing, and job- order and process costing systems and identify documentation used for each system.

3. Legal Environment and Business – 3 credits

Coursework in this content area will develop a student's knowledge of specific areas of the law including, but not limited to:

1. Contracts, Constitutional law, Criminal Law, Court structure, Negligence, Torts, Product and Strict Liability, Intellectual property and Technology law, Employment law, Ethics and Social responsibility,
2. How to analyze those areas of law to make viable business decisions.
3. The use and application of those areas of law to the various functional units within the business paradigm including, marketing, human resources, finance, accounting, and Information systems.
4. The use and application of those areas of law with respect to its impact on individual decision making.

Upon successfully completing this coursework, students will be able to:

1. Identify the requirements for a valid contract; identify the remedies available for breach of a contract.
2. Demonstrate their understanding of contract law by creating a contract to solve a problem in their lives using the fundamental contract construction rules.
3. Identify the Constitutional protections offered to the individual and demonstrate such protections through case analysis
4. Identify the court structure and system of jurisprudence within the United States and demonstrate through exam questions the notions of Stare Decisis and Federalism.
5. Identify the elements of negligence, torts, strict liability, intellectual property, employment law and ethics and be able to demonstrate such understanding through case analysis.
6. Analyze current events through the legal framework we established in class by viewing and discussing as cases that are currently in the news and are working their way through the courts.

4. Principles of Management – 3 credits

Coursework in this content area will develop a student's knowledge of specific areas of management including, but not limited to:

1. The basic activities and functions of managers in an organizational setting;
2. The influence of business functions and the behavioral sciences on the practice of management;
3. Socially sensitive tenets for working with people of different cultures;
4. Corporate social responsibility and ethics;
5. The social legal, political, economic, technological and global influences on organizations;
6. Theories and frameworks pertaining to leadership and team work; and
7. The application of leadership and teamwork theories and frameworks.

Upon successfully completing this coursework, students will be able to:

1. Define management and describe the skills managers need;
2. Describe how the following trends are impacting management practices: globalization, workforce diversity, information technology, continual learning, total quality management, ethics and trust;
3. Define organizational culture and explain how an organization's culture reflects a certain personality;
4. Explain the importance of viewing management from a global perspective;
5. Explain social responsibility and values-based management;
6. Explain what the "greening" of management is and how organizations are "going green";
7. Describe the decision-making process and conditions of certainty, risk and uncertainty;
8. Define planning and explain why objectives are important to planning;
9. Explain the importance of strategic planning and the differences between corporate-level, business-level and functional-level strategies;

10. Define organization structure and describe bureaucracy and its strengths, as well as, team-based structures;
11. Describe the human resource management (HRM) process and how HRM practices can facilitate workforce diversity;
12. Explain the characteristics of effective teams;
13. Summarize how goals motivate people and identify the characteristics that high achievers seek in a job; and
14. Describe early theories and modern views of leadership.

5. Principles of Marketing – 3 credits

Coursework in this content area will develop a student's knowledge of specific areas of marketing including, but not limited to:

1. The dynamics of business functions and processes in a marketplace setting.
2. The influences of the social, economic, technological, competitive, and global environment on organizations.
3. The various value creation and delivery facets of marketing as a business function.
4. The integral role of marketing in contemporary business enterprise.
5. The basic activities and functions of marketing personnel in an organizational setting.
6. The cross-functional perspectives of marketing processes within the business.
7. The aspects of corporate social responsibility and ethics for marketing decisions.

Upon successfully completing this coursework, students will be able to:

1. Understand and appreciate the role of marketing as an integral business function.
2. Understand the cross-functional perspectives of marketing processes within the business.
3. Assess the influences of the social, economic, technological, competitive, regulatory, and global environment on organizations.
4. Identify the role of marketing, marketing information and research in the management of a firm and the individual consumer.
5. Compare and contrast the similarities and nuances between consumer marketing and business marketing based on perspectives of supply, demand, competition, procurement, and such other aspects of both the transactional and relational components of exchange.
6. Analyze consumer markets and business markets for effective segmentation, targeting and positioning strategies.
7. Analyze the strengths and weaknesses of a company's marketing activities as well as opportunities and threats faced by the company from the business environment in order to devise appropriate marketing mix.
8. Recognize the impact of the four P's (Product, Place, Price, and Promotion) of marketing and their managerial applications in designing a marketing strategy for an organization.
9. Gain an in-depth understanding of the four elements of the marketing mix in terms of the firm's strategic/tactical planning, implementation, evaluation and control of its suited frameworks pertaining to its offerings portfolios (products/services/branding), pricing components/variables/determinants, marketing channels/distribution/logistics layouts, and promotions/advertising/sales considerations.
10. Analyze business and organizational issues in the context of marketing in a global setting with international influences.
11. Analyze and evaluate ethical and corporate social responsibility issues confronting businesses for marketing decisions.

6. Principles of Economics – 6 credits

Students will meet this requirement by completing the following approved coursework from Category 5 of the Transfer Credit Framework; (See Appendix B: Transfer Credit Framework)

- Foundation-level Macroeconomics – 3 credits
- Foundation-level Microeconomics – 3 credits

REQUIRED RELATED COURSEWORK IN MATHEMATICS

In addition to the above major-specific content, students transferring with an associate degree into a bachelor degree in Business must also successfully complete a minimum of 6 credits in the following coursework in Mathematics:

- 1. Statistics – 3 credits**
- 2. Calculus – 3 credits**

1. Statistics – 3 credits

The following competencies have been identified as essential for comparable preparation in this content area:

- Competency 1: Define basic terminologies and concepts in statistics.
- Competency 2: Use descriptive statics to grasp the essentials of a given dataset.
- Competency 3: Solve decision-making problems using probability theories.
- Competency 4: Make inferences using sample statistics and hypotheses testing.
- Competency 5: Explain the theory, terminology, and notation related to the ANOVA (completely randomized design) procedure.
- Competency 6: Explain the theory, terminology, and notation related to the chi-square, goodness-of-fit procedure.
- Competency 7: Explain the theory, terminology, and notation related to simple linear regression and correlation analysis.

See Appendix C: Competencies for Preparation in Statistics for further details.

Examples of course titles that might include such competencies are Business Statistics, Probability and Statistics, Introduction to Statistics, Statistics I, etc.

2. Calculus – 3 credits

The world around us is constantly changing. Calculus is the branch of mathematics that has been developed to study changes. Therefore, the competencies acquired through the successful study of applied business calculus provide business professionals the tools for understanding the changes that occur in the business discipline disciplines which, in turn, enables them to solve business problems as appropriate. The following competencies have been identified as essential for comparable preparation in this content area:

- Competency 1: Utilize the concept of limit.
- Competency 2: Differentiate functions.
- Competency 3: Use differential calculus to sketch curves and to solve applied problems.
- Competency 4: Integrate functions by approximation and by use of anti-derivatives.
- Competency 5: Use integral calculus to determine area and to solve applied problems.
- Competency 6: Differentiate and integrate using transcendental functions.

Examples of course titles that might include such competencies are Business Calculus, Applied Business Calculus, Applied Calculus, Calculus I, etc.

See Appendix D: Competencies for Preparation in Calculus for further details.

Appendix A: Major Requirements for Program-to-Program Articulation in Business

This articulation agreement defines a total of 30 credits of Major-Specific and Major-Related Content areas. In accordance to institutional policy, two-year institutions determine the remaining credits needed to award the associate degree.

REQUIRED Major-Specific Content Areas	TRANSFER CRITERIA
Computer Literacy – 3 credits	<ul style="list-style-type: none"> Students will meet the Principle of Economics requirement by completing 3 credits of approved foundation-level Macroeconomics and 3 credits of foundation-level Microeconomics from Category 5 of the Transfer Credit Framework.
Financial Accounting – 3 credits	
Managerial Accounting – 3 credits	
Legal Environment and Business – 3 credits	
Principles of Management – 3 credits	
Principles of Marketing – 3 credits	
Principles of Economics – 6 credits	
<u>REQUIRED</u> Related Coursework in Mathematics	TRANSFER CRITERIA
Statistics – 3 credits	See Appendix C for the required competencies.
Calculus – 3 credits	See Appendix D for the required competencies.

Appendix B: Transfer Credit Framework

Students who successfully complete courses from the categories below may transfer those credits toward the graduation requirements of nearly any major offered by the participating institutions. Please be aware that certain majors may have specific requirements prescribed by external agencies. Students should work with an advisor to select appropriate courses as they relate to the major.

Category 1 (3-4 credits total)	Category 2 (3-4 credits total)	Category 3 (min. 3-4 credits; max. 6-8 credits)	Category 4 Must include lab (min. 3-4 credits; max. 6-8 credits)	Category 5 (min. 3-4 credits; max. 6-8 credits)	Category 6 (min. 3-4 credits; max. 6-8 credits)
English Composition	Public Speaking	Foundations of Mathematics	General Chemistry I (majors & non-majors courses)	General Psychology	Introduction to Music
		College Algebra	General Chemistry II (majors & non-majors courses)	Introduction to Sociology	Introduction to Philosophy
		Elementary Statistics	General Biology I (majors & non-majors courses)	American National Government	Elementary Spanish I
		Precalculus	General Biology II (majors & non-majors courses)	Educational Psychology	Elementary Spanish II
		Calculus I	General Physics I (non-calculus)	History of Western Civilization II	Painting I
			General Physics II (non-calculus)	Principles of Macroeconomics	Elementary French I
			Anatomy & Physiology I	Principles of Microeconomics	Elementary French II
			Anatomy & Physiology II	U.S. History I	Drawing I
			Introduction to Astronomy	U.S. History II	Ethics
				History of Western Civilization I	Introduction to Art
				Contemporary Social Problems	German I
				Introduction to Anthropology	German II
					Introduction to Literature (may also be known as Introduction to Poetry, Interpreting Literature, Reading Literature, Theses in Literature, Topics in Literature, Current Themes in Literature)
					Survey of American Literature
					Literature of the Western World
					World Literature
					American Literature
					Survey of English Literature
					Introduction to Theatre

Appendix C: Competencies for Preparation in Statistics

Here are the basic competencies for most statistics courses:

1. Define basic statistical terminology and concepts, including descriptive and inferential statistics, population, sample, statistical inference, reliability of inferences.
2. Use basic statistical notation.
3. List the different data types and explain the various rationales for classification of data into each typology.
4. Group data, construct, and explain frequency distribution tables, frequency histograms, frequency polygons, and ogives.
5. Calculate and explain the use of quantitative descriptors of ungrouped data.
6. Explain basic probability theory, terminology, and notation.
7. Calculate the solutions to problems that use the additive and multiplicative rules for probability.
8. Calculate the solutions to problems involving discrete random variables based on the binomial and Poisson probability distributions.
9. Calculate the solutions to problems involving continuous random variables based on the normal, uniform, and exponential probability distributions.
10. Explain basic inferential statistical theory, terminology, and notation related to sampling distributions, confidence intervals, and hypothesis testing.
11. Construct "t" and "z" confidence intervals for the estimation of the population mean.
12. Perform one-sample and two-sample hypothesis tests for the population mean and for the difference between two population means.
13. Explain the theory, terminology, and notation related to the ANOVA (completely randomized design) procedure.
14. Explain the theory, terminology, and notation related to the chi-square, goodness-of-fit procedure.
15. Explain the theory, terminology, and notation related to simple linear regression and correlation analysis.

TOPICAL COURSE OUTLINE

Introduction

Descriptive Graphs and Descriptive Measures

Probability Concepts

Discrete Probability Distributions

Continuous Probability Distributions

Statistical Inference

Sampling and Sampling Distribution

Hypothesis Testing for the Mean of a Population

Inference Procedures for the Comparison of Two Populations

Analysis of Variance

Chi-Square Tests

Statistic Simple Linear Regression and Correlation

Appendix D: Competencies for Preparation in Calculus

Competency 1: Utilize the concept of limit.

Behavioral Objectives: In order to attain this competency, the student should be able to:

- 1.1. determine limits using a table of values or graph.
- 1.2. evaluate limits of polynomial, and rational functions by direct substitution.
- 1.3. where substitution yields an indeterminate form, find limits by cancellation and rationalization techniques or by the use of identities.
- 1.4. evaluate limits using the Squeeze Theorem.
- 1.5. use limit theorems involving sums, differences, products, and quotients of functions.
- 1.6. indicate whether a function is continuous or discontinuous; if discontinuous, give all points of discontinuity.
- 1.7. determine limits at infinity.

Competency 2: Differentiate functions.

Behavioral Objectives: In order to attain this competency, the student should be able to:

- 2.1. define and interpret the derivative of a function.
- 2.2. compute derivatives of functions using the definition.
- 2.3. obtain the derivatives of sums, products, quotients, and powers of polynomial and exponential functions using the general formulas for differentiation.
- 2.4. use the chain rule to differentiate the composition of functions.
- 2.5. find differentials.
- 2.6. differentiate implicitly.
- 2.7. find higher order derivatives.
- 2.8. evaluate derivatives.

Competency 3: Use differential calculus to sketch curves and to solve applied problems.

Behavioral Objectives: In order to attain this competency, the student should be able to:

- 3.1. find the intervals on which a function is increasing or decreasing and the intervals on which a function is concave upward or concave downward.
- 3.2. determine relative minima, relative maxima, and points of inflection, if any, and sketch the graph of a function.
- 3.3. find the equations of lines tangent and normal to a curve at a given point.
- 3.4. find the point(s) on a curve where the tangent line has a given slope.
- 3.5. use differentials to approximate values of non-linear functions.
- 3.6. solve applied related rate problems.
- 3.7. solve applied maximum-minimum problems.
- 3.8. apply the Extreme Value Theorem to a function.

Competency 4: Integrate functions by approximation and by use of antiderivatives.

Behavioral Objectives: In order to attain this competency, the student should be able to:

- 4.1. define the indefinite and definite integral of a function.
- 4.2. find antiderivatives by using the power rule and substitution.
- 4.3. integrate algebraic functions.
- 4.4. determine the constant of integration given sufficient conditions.
- 4.5. use the Fundamental Theorem of Calculus to evaluate definite integrals.

Competency 5: Use integral calculus to determine area and to solve applied problems.

Behavioral Objectives: In order to attain this competency, the student should be able to:

- 5.1. find the area of a region bounded by the graphs of given equations.
- 5.2. find the length of a plane curve.
- 5.3. calculate the average value of a function and use the Mean-Value Theorem for Integrals

Competency 6: Differentiate and integrate using transcendental functions.

Behavioral Objectives: In order to attain this competency, the student should be able to:

- 6.1. find derivatives of functions involving the natural logarithmic function.
- 6.2. differentiate and integrate natural exponential functions.
- 6.3. differentiate and integrate exponential functions that have bases other than e .
- 6.4. solve growth and decay problems.

ADDENDUM

GENERAL STATEWIDE PROGRAM-TO-PROGRAM ARTICULATION in PENNSYLVANIA

WHEREAS, the General Assembly of the Commonwealth of Pennsylvania enacted Act 114 of 2006, which added to the Public School Code of 1949, Article XX-C entitled “Transfers of Credits Between Institutions of Higher Education” (referred to in this Agreement as the “Statewide Transfer System”);

WHEREAS, Act 114 of 2006 requires all community colleges in Pennsylvania and Pennsylvania State System of Higher Education (PASSHE) universities to participate in the Statewide Transfer System;

WHEREAS, Act 114 of 2006 permits independent and state-related institutions of higher education in Pennsylvania, as each is defined in Article XX-C, to elect to participate in the Statewide Transfer System;

WHEREAS, the General Assembly of the Commonwealth of Pennsylvania enacted Act 50 of 2009, which requires institutions participating in the Statewide Transfer System to accept the transfer of Associate of Arts and Associate Science degrees into parallel baccalaureate programs and recognize all competencies attained within the associate degree program;

WHEREAS, Act 50 of 2009 defines an Associate of Arts (AA) or Associate of Science (AS) degree containing a minimum of 60 college-level credits and designed primarily for transfer to a baccalaureate institution;

WHEREAS, Act 50 of 2009 requires the Transfer Articulation Oversight Committee (TAOC), as established in section 2004-C of the Public School Code of 1949, to identify Associate of Arts and Associate of Science degree programs for transfer with full junior standing into parallel baccalaureate degrees annually; and,

WHEREAS, Act 50 of 2009 requires members of the Transfer Articulation Oversight Committee established in section 2004-C of the Public School Code of 1949, to identify modifications that may be required in existing associate or baccalaureate degrees to satisfy external accreditation or licensure requirement;

All Institutions participating in the Statewide Transfer System enter into this Articulation Agreement and mutually agree as follows:

1. The statewide program-to-program articulation agreement ensures that students who complete an AA or AS degree from a participating institution will have their coursework and credits transfer into a parallel baccalaureate program with full junior standing and without the need for course-by-course equivalency.
2. Students are subject to the admissions and transfer credit policies of the participating institutions. The admissions and transfer credit policies for all of the institutions participating in Pennsylvania’s college credit transfer system can be found at www.PAcollegetransfer.com.
3. The AA or AS degree must include a minimum of 60 college-level credits designed and acceptable for transfer, not including developmental or remedial courses or career, technical or applied courses.
4. The transfer of coursework with a grade less than a C (2.0 on a 4.0 scale) in the AA or AS will be consistent with the policies of native students at the participating college or university.
5. Students and institutional personnel will be able to find out which institutions offer articulated programs by accessing a searchable database located at www.PAcollegetransfer.com. PDE will maintain this database through program information provided to TAOC by the individual participating institutions.
6. **Responsibilities of Associate Degree Institutions**
 - a. The AA or AS degree leading to a parallel bachelor degree will include the minimum number of credits and competencies of major-specific coursework as defined by the Agreement.

- b. The AA or AS degree will meet the minimum requirements of the Commonwealth's Transfer Credit Framework ("Framework"), as defined by the Statewide Transfer System.
- c. Any remaining AA or AS degree requirements will be accepted from arts and sciences electives designed and acceptable for transfer, not including developmental, remedial, career, technical or applied courses.
- d. By awarding the AA or AS, the Associate Degree Institution is validating that the student has met the competency requirements outlined in the Agreement.

7. Responsibilities of Bachelor Degree Institutions

- a. The Bachelor Degree Institution will recognize all competencies attained within the AA or AS degree and accept a transfer student who has earned the associate degree with full junior standing into a parallel baccalaureate degree program.
- b. All decisions made with respect to the transfer process shall be based on the principle of equivalence of expectations and requirements for native and transfer students.
- c. A transfer student's admission into the parallel baccalaureate degree will be subject to the Bachelor Degree Institution's specific requirements for admission to that major and be consistent with such requirements for native students.

8. Agreement Revision and Assessment

- a. Once a statewide program-to-program articulation agreement has been approved by TAOC, no amendments to the agreement can be offered by any party within the initial six (6) months of the agreement. After that time, a TAOC member with a proposed amendment to an approved agreement should submit the change to PDE.

Amendments that are offered as clarifying or technical but do not alter the substantive portions or intent of the agreement must be forwarded to TAOC. TAOC representatives will have at least thirty (30) days to review, comment and approve or deny the proposed amendments.

Amendments that seek to alter the substantive nature or intent of the agreement in any part must be forwarded to the appropriate PAC for review and consideration. The PAC will then make a recommendation to the TAOC, and TAOC shall approve or deny the proposed amendments.¹

- b. PDE and TAOC will exercise responsibility for monitoring the effectiveness of the Agreement and its implementation.
- c. PDE shall collect data annually from the participating institutions that will enable the Department and TAOC to assess the effectiveness of the implementation of the Agreement in fostering a seamless transfer process and the academic success of transfer students at the senior institutions.

9. Transfer Appeal Process

- a. In accordance with Pennsylvania's Statewide Transfer System, each Bachelor Degree Institution shall have a procedure through which a transfer student can appeal a decision that he/she believes is not consistent with this Agreement.
- b. The Transfer Appeal Process shall be published, at minimum, in the institution's catalog and posted to the Commonwealth's official website of the Statewide Transfer System, www.PAcollege-transfer.com.

¹ Approved by TAOC and added to agreement on August 18, 2011.

10. Institutional Resolution of Disputes

- a. In the event that an Associate Degree Institution considers the decision of a Bachelor Degree Institution to be inconsistent with this Agreement, the Associate Degree Institution shall consult directly with the Bachelor Degree Institution and attempt to resolve the matter.
- b. If the institutions are unable to resolve the issue, the Associate Degree Institution may submit their concern to PDE for consideration by the TAOC Dispute Resolution Committee. The Dispute Resolution Subcommittee will act according to the policies and procedures developed by TAOC as part of the Statewide Transfer System. The determination made by the Dispute Resolution Subcommittee will be binding upon the parties.

11. Implementation Date and Applicability

Having fulfilled the requirements outlined in the Program-to-Program Articulation Agreement, students transferring with an AA or AS degree from a participating institution will be considered by the receiving baccalaureate degree institution to have received adequate preparation in the field of study at the foundation level and therefore eligible to transfer as a junior into advanced major coursework.

Participating institutions will enact the Agreement in accordance to the timeline outlined by the TAOC, but no later Fall 2013.²

Continuation of the agreement remains in effect until such time as all cooperating institutions of the Statewide Transfer System formally approve any revisions.

GLOSSARY OF TERMS

Articulation: The aligning of curriculum between institutions of higher education to ensure the efficient and effective movement of students among those institutions.

Associate of Arts (AA) and Associate of Science (AS) Degree: A degree consisting of at least 60 college-level credits and designed for transfer into a baccalaureate degree program.

Foundation Coursework: Courses at a level of comprehension usually associated with freshman and sophomore students and typically offered during the first half of a baccalaureate degree program. Such coursework typically does not have course prerequisites.

Native Student: A student who entered a given college or university without first matriculating at another college.

Parallel Baccalaureate Degree: A bachelor degree program in a comparable field of study and with similar foundation-level major-specific competencies as an associate degree program.

Receiving Institution: The college or university where a transfer student plans to enroll and to apply previously earned credit toward a degree program.

Transfer Credit: The credit granted by a college or university for college-level courses or other academic work completed at another institution.

Transfer Student: A student who enters a participating college or university after earning college-level credit at another college or university.

² Agreements approved by TAOC prior to August 31, 2011 must be implemented by the institutions by Fall 2012. Agreements approved by TAOC after August 31, 2011 but before May 1, 2012 must be implemented by the institutions by Fall 2013.

Transfer: The process by which a student moves from one postsecondary institution to another. Also refers to the mechanics of credit, course and curriculum exchange between institutions.

Advanced Coursework: Courses with advanced depth of content knowledge in the field of study and carry the expectation of more complex competencies identified in the expected student learning outcomes is referred to as advanced coursework. These courses often have prerequisites and are usually beyond the “Introduction to…” or “Foundation of…” level.