

Key Concepts for 2021 Placement and Exemption Exams

Please use these as a guide for concepts that may be covered in each placement and exemption exam. Heinz College does not provide study guides for these exams. If you are interested in learning more information about the specific courses, please visit the [Heinz College course catalog](#). Additional clarification or information about exam topics will not be provided.

90-710 Applied Economic Analysis (or 90-709)

The exam will cover material in a college-level introductory microeconomics course – as set out in a standard textbook such as *Principles of Microeconomics* by Robert Frank and Ben Bernanke. Key concepts include all of the material in such a course, including: the competitive model (supply and demand); monopoly; game theory; externalities; the economics of information; labor markets; and public goods.

90-711 Statistical Reasoning with R (or 90-707, 90-777)

The Key Concepts for the Statistics placement exam are:

- Statistical inference: confidence intervals, p-values, sampling distributions
- Linear Regression with one predictor
- Data organization and notation skills relevant to statistical programming

They would need to show mastery of all of these to be EXEMPT from any statistics class, variable levels of mastery on the others would indicate which of the 3 classes available is most appropriate.

90-718 Strategic Presentation Skills

As students in a graduate-level program in a highly specialized field, learning to talk to different audiences about the work that you do, the technologies you utilize, and the conceptual frameworks you use is incredibly important. You may often find yourselves working to describe your work to non-experts; therefore, learning how to alter your language and approach to fit these different audiences is key to successfully sharing your findings and ideas. Presentations to non-experts may take the form of media appearances, presentations of research findings to policymakers, project proposals to grant committees, product presentations to a company CEO or even discussion of research in job interviews.

90-717, 93-717, 95-717 Writing

Writing courses at Heinz focus on transferable, career-enhancing writing skills such as:

- Writing in various contexts, such as professional, academic, public relations, and policy related writing
- Targeting writing to particular readers across diverse potential audiences
- Conveying critical thinking by anticipating the perspectives of stakeholders in a variety of professional situations
- Applying persuasive techniques appropriately and effectively
- Distinguishing between essential and non-essential information
- Communicating complex, data-heavy topics clearly and accurately in specific, plain language
- Creating logical organizational structures and maintaining consistency throughout documents

- Using formatted headings, lists, data, citations, and visuals to create readable and accessible documents
- Creating efficiently phrased, actionable communications
- Editing documents thoroughly and providing actionable, specific, and constructive feedback on written documents to others

The Writing Exemption exam will ask students to produce a professional document in response to a specific prompt. The exam will be assessed based on the document's clarity, conciseness, organization, format, grammar, punctuation, capitalization, spelling, and overall professionalism in communication.

90-723 Financial Statements and Analysis of Companies

1. Financial accounting principles and concepts – covering accounting for companies, not-for profit organizations, and government.
2. Financial accounting methods – accrual, cash, and modified accrual.
3. Key financial reports and analytical techniques – time series analysis, vertical analysis, and benchmarking analysis.
4. Analyzing key line items in balance sheet, covering C&CE, AR, inventories, PP&E, intangible assets, ST liabilities, LT liabilities and equity.
5. Analyzing key line items in income statement: from net revenues, COGS, OPEX, EBIT and EAT to EPS and DPS.
6. Analyzing key line items in statement of cash flows: from CFO, CFI, CFF, change in cash, and cash at the end.
7. Analyzing notes and MD&A of financial reports and other professional reports.
8. Financial data analytics (including all types of ratio analysis) using the current financial report of a U.S.-exchange listed pharmaceutical company.

90-728 Introduction to Database Management (also 93-732 - Database Theory and Practices for Creative Enterprises)

Important topics covered in the course that may appear on the exemption exam.

- Relational database architecture - characteristics of database tables and entity relationships, cardinality ratios (1:M, 1:1, M:N), optional and mandatory participation, primary and foreign keys
- Basic SELECT query construction using a visual query generation tool
- Understanding of inner and outer database joins
- Basic query construction using SQL Select statements (Select, From, Where, Group By, Having, Order By). No subqueries.
- Entity Relationship Diagrams –create using any standard modeling notation

90-812 Introduction to Programming with Python

- Creating and using variables, and the rule for legal variable names
- The concepts of reference and object id
- Low-level scalar data types: int, float, bool, str, and NoneType (None)
- Creating, manipulating, analyzing, and formatting character string (str) objects
- Arithmetic operators and their precedence and associativity rules
- Using assignment operators: =, +=, *=, etc.
- Making decisions with if/elif/else
- Equality/inequality, relational, and logical operators and their precedence and associativity rules
- Looping with for and while
- The range() function, and the concept of iterable
- Creating, manipulating, analyzing, and iterating through list, tuple, set, and dict objects
- Defining and calling functions
- Using existing modules of functions and objects, and defining new modules
- Creating, manipulating, and analyzing NumPy ndarray objects

90-819 Intermediate Programming with Python

- Use a Python integrated development environment like Idle or Spyder
- Declare and assign variables with arithmetic and string operations
- Use decision structures and conditional operators
- Construct loops: for and while
- Write and call functions and produce modules of function definitions for code reuse.
- Process files: text and CSV
- Form and manipulate collections of data: list, tuple, set, dict, NumPy ndarray, and Pandas Series and DataFrame
- Connect to a relational database
- Use web scraping and API's to retrieve data
- Demonstrated problem-solving skills through practice and understanding of the top-down approach.
- Create object-based algorithms to solve real-world problems using the Python language.

90-838 Database Management for Policy Analytics

Important topics covered in the course that may appear on the exemption exam.

- The relational data model excluding relational algebra.
- Advanced use of Structured Query Language (SQL) including different join types, all types of subqueries, analytical functions, regular expressions, enhanced aggregate queries, and set operations.
- Database performance issues, data access methods, and use of query execution plans to improve query performance.
- Database analysis and design methodologies including conceptual, logical, and physical design.
- Enhanced entity-relationship modeling using any standard modeling notation. Enhanced includes specialization and generalization.
- Basic normalization (up through 3rd normal form)

94-834 Applied Econometrics I

Please review the current course description and syllabus as posted on the Heinz College course catalog: https://api.heinz.cmu.edu/courses_api/course_detail/94-834/

95-703 Database Management

Students should know the following:

- Understand relational database concepts
- Know how to design database including ERD, EERD, and Normalization
- Have good knowledge of Structured Query Language (SQL)

95-710 Economic Analysis

- Microeconomics
- Demand, Supply, Efficiency
- Monopoly, competition, and other market structures
- Game theory
- Externalities, Lock-in, Switching costs
- Asymmetric information and consumer decision making

95-715 Financial Accounting

While not exhaustive, the following are concepts covered in Financial Accounting. No Spreadsheets or finance calculators are permitted. Students must use the scientific calculator provided in the Respondus Browser. A formulas sheet will be Emailed to students taking the exam. No other reference or material (hard copy or electronic) or tools are permitted.

1. Market Capitalization
2. Book Value
3. Market Capitalization to Book Value Ratio and interpret
4. Why would the Market Capitalization and Book Value be different
5. Relationship between Stockholders, Board of Directors and Management.
6. Proprietorship vs. Corporation
7. Accounting Concepts and Conventions (like "conservatism")
8. Calculate Income on the Accrual and Cash Basis of Accounting. Which basis of accounting is better and why?
9. List major types of Balance Sheet accounts
10. Identify and calculate balance in common Balance Sheet accounts
11. What is the Accounting Equation (Balance Sheet Equation: Assets = Liabilities + Equity)
12. Common Accounts and composition in Equity
13. Change in Retained Earnings
14. What are the major classifications of Assets and Liabilities – how are these classifications determined
15. Criteria to record Assets, Liabilities
16. Explain Capitalization of Costs
17. Leases
18. Loan amortization
19. Impact of change in stock price on financials

20. Intangible Asset Valuation
21. Common Stock vs Preferred Stock.
22. Calculate balance in Stock, Additional Paid in Capital, Retained Earnings and Total Equity
23. Dilution
24. Dividends
25. Stock Terminology (Authorized, Issued, Outstanding, Treasury)
26. Contingent liabilities- classification and recording
27. Sarbanes-Oxley Legislation
28. Stock Split
29. List major types of Income Statement Accounts
30. Criteria to record Revenue, Expenses
31. Calculate revenue given recognition method
32. Identify and calculate common Income Statement accounts
33. Period Costs vs Product Costs
34. Capital gains vs revenues
35. Calculate and describe levels of Profit
36. Calculate straight line and units of production depreciation
37. Calculate Depreciation Expense and Accumulated Depreciation Account Balance
38. Compare Straight-line Depreciation vs. Accelerated Methods
39. Compare the impact of LIFO and FIFO on the Financial Statements
40. Calculation and manipulation of Cost of Goods Sold (COGS)
41. Calculate Bad Debt Expense using Accounts Receivables Aging
42. Factoring with Recourse or Without Recourse
43. Explain how managers can manipulate Financial Statements within GAAP
44. Name and describe the 3 major types of activities in a business
45. Calculate cash flow using the indirect method
46. Interpret Cash flow Statement
47. Identify and use of financial ratios
48. Calculate and interpret result of financial ratios.
49. Calculate Common Size financial statements and interpret
50. Interpret trends and comparison to benchmarks
51. Identification and use of economic indicators

95-716 Principles of Finance

While not exhaustive, the following are concepts covered in Principles of Finance. No Spreadsheets or finance calculators are permitted. Students must use the scientific calculator provided in the Respondus Browser. A formulas sheet will be emailed to students taking the exam. No other reference or material (hard copy or electronic) or tools are permitted.

1. Simple vs compound interest
2. Calculate Time Value of Money (PV), (FV), (PVA), (FVA),
3. Understand how to use growing annuities (PVGA), (FVGA)
4. Perpetuities and Growing Perpetuities
5. Calculate a payment (divide annuity factor into lump sum)
6. Multiple payments per year
7. Real vs. Nominal vs. Inflation Rates
8. Continuous Compounding
9. APR vs EAR
10. Incremental Costs & Benefits
11. Cash flows vs Accounting income

12. Sunk Cost
13. Indirect effects, allocation of overhead, soft benefits
14. Calculation and interpretation of Weighted Average Cost of Capital (WACC)
15. Impact of Taxes on WACC
16. Different terms used for WACC
17. Capital Asset Pricing Model (CAPM)
18. Interpretation Beta
19. Market Rate of Return vs. Market (Risk) Premium
20. Risk and Return concepts
21. Capital Structure
22. Calculation and interpretation of Net Present Value (NPV)
23. NPV decision rule
24. Calculation and interpretation of Internal Rate of Return (IRR)
25. IRR decision rule
26. Limitations of IRR
27. Calculation and interpretation of Discounted Payback Period
28. Decision Rule for Discounted Payback Period
29. Calculation and interpretation of Benefit Cost Ratio and Profitability Index
30. Decision Rule for BCR and PI
31. Economic Value Added
32. Capital Allocation
33. Capital Rationing – Hard vs Soft Rationing
34. The rule of 72
35. Replacement Chain calculation & interpretation
36. Equivalent Annual Annuity calculation & interpretation
37. Calculating and interpreting Real Options – Expand, Abandon, Delay
38. NPV Profile
39. Calculating and interpreting Crossover Rate
40. Calculating Free Cash Flows
41. Sensitivity, Scenario and Simulation Analysis
42. Calculation and interpretation of Expected Monetary Value (EMV)
43. Breakeven in units
44. Breakeven in dollars
45. Multi-product Breakeven
46. Use and limitations of Full Absorption Costing
47. Margin of Safety and contribution margin
48. Alternative uses of Breakeven (CVP)
49. Fixed Cost, Variable Cost identification and behavior
50. High-low method and statistical method to evaluate Mixed Costs.

95-719 Accounting and Finance Foundations

While not exhaustive, the following are concepts covered in Accounting and Finance Foundations. No Spreadsheets or finance calculators are permitted. Students must use the scientific calculator provided in the Respondus Browser. A formulas sheet will be emailed to students taking the exam. No other reference or material (hard copy or electronic) or tools are permitted.

1. Market Capitalization
2. Book Value
3. Market Capitalization to Book Value Ratio and interpret

4. Why would the Market Capitalization and Book Value be different
5. Relationship between Stockholders, Board of Directors and Management.
6. Proprietorship vs. Corporation
7. List major types of Balance Sheet Accounts
8. What is the Accounting Equation (Balance Sheet Equation: Assets = Liabilities + Equity)
9. Equity is stock and Retained Earnings
10. Change in Retained Earnings = (Revenues – Expenses +Capital Gains – Capital Losses-Dividends
11. What are the major classifications of Assets and Liabilities – how are these classifications determined
12. Criteria to record Assets, Liabilities
13. Impact of a change in market price of stock on financial statements
14. Common Stock and Preferred Stock.
15. Calculate balance in Stock, Additional Paid in Capital, Retained Earnings and Total Equity
16. Dividends
17. Classifications of Stock (Authorized, Issued, Outstanding, Treasury)
18. Contingent liabilities and how they are classified
19. Identify and calculate balance of common Income Statement and Balance Sheet Accounts
20. Criteria to record Revenue, Expenses
21. Types of Expenses
22. Calculate and distinguish between capital gains/losses and revenues
23. Calculate Income and Retained Earnings
24. Calculate straight line depreciation
25. Calculate Depreciation Expense and Accumulated Depreciation Account Balance
26. Calculate different levels of profit
27. Name and describe the 3 major types of activities in a business
28. Calculate Cash Flows using the Indirect Method
29. Interpret Cash flow Statement
30. Given Financial Statements, calculate and interpret various financial ratios.
31. Calculate Common Size financial statements and interpret
32. Incremental Costs & Benefits
33. Cash flows vs Accounting income
34. Sunk Cost
35. Indirect effects, allocation of overhead, soft benefits
36. Calculation and interpretation of Weighted Average Cost of Capital (WACC)
37. Impact of change in Taxes or beta on WACC
38. Impact of change in capital structure on WACC
39. Different terms used for WACC
40. Capital Asset Pricing Model (CAPM)
41. Interpretation Beta
42. Market Rate of Return vs. Market (Risk) Premium
43. Risk and Return concepts
44. Capital Structure
45. Calculation and interpretation of Net Present Value (NPV)
46. NPV decision rule
47. Impact of change of WACC on NPV
48. Calculation and interpretation of Internal Rate of Return (IRR)
49. IRR decision rule
50. Limitations of IRR
51. Interpretation of Modified IRR (MIRR)
52. Calculation and interpretation of Discounted Payback Period
53. Decision Rule for Discounted Payback Period
54. Calculation and interpretation of Benefit Cost Ratio and Profitability Index

55. Decision Rule for BCR and PI
56. Calculation and interpretation of Economic Value Added
57. Capital Allocation
58. Capital Rationing – Hard vs Soft Rationing
59. The rule of 72
60. Mutually Exclusive Projects vs Yes/NO Single Project Decisions
61. NPV Profile design and interpretation
62. Crossover Rate interpretation and calculation
63. Replacement Chain calculation, interpretation and decision rule
64. Equivalent Annual Annuity calculation, interpretation and decision rule
65. ENPV calculation, interpretation and decision rule
66. Option to Expand calculation
67. Option to Abandon calculation
68. Option to Delay calculation
69. Value of an Option calculation and interpretation
70. Breakeven in units
71. Breakeven in dollars
72. Multi-product Breakeven
73. Margin of Safety and contribution margin
74. Calculation of Profit
75. Capacity
76. Classify Variable Cost and Fixed Cost
77. Cost Behaviors of Fixed Variable and Mixed Cost
78. Alternative uses of Breakeven (CVP)

95-796 Statistics for IT Managers

Statistic for IT Managers (95-796) is an accelerated, 7 week introductory statistics. It includes four modules—a brief module on descriptive statistics and graphical methods (e.g., boxplots), a module on probability basics (e.g, independence, Bayes' Rule, discrete random variables, normal distribution, Central Limit Theorem), a module on hypothesis testing and confidence intervals, and a module on regression. For those of you who already have some background in statistics it is intended as a refresher course to ready you for advanced courses in econometrics and machine learning and for those of you with little or no background in statistics it is intended to quickly get you up to speed for these courses.