Document Type: Reference Guide

Revision Number: 5.0

Project Name: HUEXT

**Sample Only**

This document was submitted by students in a previous class. Their requirements were different from yours. We offer it only as a sample of what a project was for that class. Copying this document, in whole or in part, and submitting the result as your own work, would be a violation of the honor code.

**How the calculation works**

The following is a list of inputs and input streams available to users. This includes a definition of what the data is, how it is calculated, and any interaction or dependencies that exist. They are listed in the order in which they appear on the Inputs worksheet:

Inputs Worksheet:

**Maximum Enrollment** - input the total number of new students admitted to the school in a semester.

**Number of Semesters per Year** - input the number of semesters in an academic year.

**Number of Periods** - input the number of periods included in the model. This field is only informational; it is not used in calculations.

**Program Name** - input the academic programs available to students. These values are used as labels for other inputs.

**Staff Type** - input the types of staff available to teach classes. These values are used as labels for other inputs.

**Enrollment Distribution** - input the distribution of the students across programs as a percentage. Note the label comes from the Program Name input and must be modified there.

**Projected Enrollment Rate** - input stream representing the enrollment rate per semester as a percentage of the Maximum Enrollment input. Note the header is based on Used Header input chosen below.

**Projected Withdrawal Rate** - input stream representing the withdrawal rate of students in future semesters as a percentage of the number of students that actually enroll in a semester.

**Projected Graduation Rate** - input stream representing the projected graduation rate of students in future semesters as a percentage of the number of students that actually enroll in a semester.

**Class Size** - input the maximum class size per academic program. Note the label comes from the Program Name input and must be modified there.

**Annual Tuition Increase Rate** - input the percentage by which tuition will increase each academic year. Note: this is by year not semester.

**Tuition Fees** - input the base tuition per class for the first academic year. This fee can increase at the start of each academic year.

**Registration Fees** - input the registration fee paid each time a student registers for a class. This fee remains constant across all semesters in the model.

**Staff Salary** - input the salary paid to each staff per semester per class. Note the label comes from the Staff Type input and must be modified there.

**Staff per Class by Program** - input the staff required per class by program and staff type. Note the labels come from the Program Name and Staff Type inputs and must be modified there.

**Infrastructure Type** - input the different types of infrastructures used by each class. These values are used as labels for other inputs.

**Infrastructure Cost per Student** - input the cost per student per class for each of the Infrastructure Types. Note the label comes from the Infrastructure Type input and must be modified there.

**Classroom Type** - input the types of classrooms available for classes. These values are used as labels for other inputs.

**Classroom Capacity** - input the maximum student capacity for each Classroom Type. Note the label comes from the Classroom Type input and must be modified there.

**Classroom Costs** - input the cost per Classroom Type per class per semester. Note the label comes from the Classroom Type input and must be modified there.

**Years Abbreviation** - input the abbreviation to use for academic years in table headers throughout the model.

**Semester Abbreviation** - input the abbreviation to use for semesters in the table headers throughout the model.

**Use Header** - input the number from the Header No. column that corresponds to the header to be used throughout the model. When you change this input the values in the cells to the right will update based on the number entered.

There are several intermediate calculations throughout the model and four main outputs. These calculations use the following worksheet functions and add-ins: Transpose(), Column(), Me, Int(), Row(), Index(), Lt, Up, Convolve(), FV(), Sum(), Round(), MMULT(), Ceiling(), Offset(), and If(). A table of the worksheets where these functions are used is included in the Appendix for reference (See Table #A.1).

The following is a list of those calculations and outputs including a definition, how it is calculated, and any interaction or dependencies that exist. They are ordered first by the worksheet they appear in and then by the order in which they appear on the worksheet.

Inputs Worksheet:

**Period Base** – calculation that numbers the periods sequentially.

**Years Completed** – calculation showing the number of completed years based on the period number in Period Base calculation and Number of Semesters per Year input.

**Current Year** – calculation showing the current year for that each period based on the period number in the Period Base calculation and the Number of Semesters per Year input.

**Current Semester** – calculation showing the current semester for each period within each academic year based on the Period Base calculation, Year Completed calculation, and Semesters per Year input.

**Period** – calculation of a header row using the Semester Abbreviation input and Period Base calculation.

**Semester** – calculation of a header using the Semester Abbreviation input and Current Semester calculation.

**Year** – calculation of a header row using the Year Abbreviation input and Current Year calculation.

**YearSemester** – calculation of a header using the combined Year and Semester calculation values.

**Header No.** – calculation that creates an index of the possible headers rows that can be chosen by the user.

**Header to use** – calculation that populates the header to be used from the Table Header Calculations table based on the index value chosen by the user in the Use Header input field.

Enrollment Analysis Worksheet:

**Enrollment Distribution Count** – calculation using the Maximum Enrollment input and Enrollment Distribution input to get the count of students per Program.

**Cumulative Enrollment Rate** – calculation of a running sum of total students enrolling per semester.

**Projected Enrollment Drop** – calculation summing the Projected Withdrawal Rate input and the Projected Graduation Rates input.

**Cumulative Enrollment Drop** – calculation of a running sum of total students leaving the school per semester.

**Total Enrollment Rate** – calculation of the difference between the Cumulative Enrollment Rate calculation and Cumulative Enrollment Drop calculation.

**Tuition Fees** – calculation populating the base tuition from the Tuition Fees input for each period.

**Adjusted Tuition Fees** – calculation of the actual tuition per period using the Annual Fee Increase input, Years Completed calculation, and Tuition Fees calculation.

**Registration Fees** – calculation populating the registration fees from the Registration Fees input for each period.

**Total Fees** – calculation of the total fees collected based on the sum of the Adjusted Tuition Fees and Registration Fees calculations.

Class Analysis Worksheet:

**Enrollment Analysis** – calculation of the count of students per Program per Semester using the Enrollment Distribution Count and Total Enrollment Rate calculations.

**Class Need Analysis** – calculation of the count of classes needed per Program per Semester by dividing the Enrollment Analysis calculation by the Class Size input. Note the result is a decimal value not a whole number and you can’t have decimal value of a class.

**Class Need Analysis - Actual** – calculation that rounds the Class Need Analysis calculation up to the next whole number using the ceiling worksheet function.

**Total Classes** – this is an informational calculation that shows the total number of classes the school will run per semester by summing the Class Need Analysis – Actual calculation.

**Class Capacity** – this is an informational calculation that shows the total number of students that could be enrolled per program based on the Class Need Analysis calculation and the Class Size Input.

**Available Class Spaces** – this is an informational calculation that shows the total number of vacant spaces in each program per semester based on the Class Capacity and Enrollment Analysis calculations.

**Average Class Size** – this is an informational calculation that shows the average class size per program per semester based on the Enrollment Analysis and Class Need Analysis – Actual calculations.

Staff Analysis Worksheet:

**Staff Need Analysis** – calculation of the total count of staff by Staff Type per semester based on the Classes Needed Analysis – Actual calculation and the Staff Per Class by Program input.

**Staff Salary Analysis** – calculation of the total salary for each Staff Type per semester based on the Staff Need Analysis and Staff Salary input.

**Total Staff Salary** – this is an **output** calculation that shows the total salary output per semester and is based on the Staff Need Analysis and Staff Salary Analysis calculations.

InfraAnalysis Worksheet:

**Classroom Infrastructure Costs** – calculation of the total costs per Classroom Type and Infrastructure Type based on the Classroom Capacity and Infrastructure Costs per Student inputs.

**Classroom Total Costs** – calculation of the total costs per Classroom Type based on the sum of Classroom Costs input and the Classroom Infrastructure Costs calculation.

**Infrastructure Cost per Program** –calculation of the total infrastructure costs per Program based on the Classroom Total Costs associated with the Classroom Size needed for the Program Class Size.

**Infrastructure Cost Analysis** – calculation of the total infrastructure costs per Program per semester based on the Class Need Analysis – Actual and Infrastructure Cost per Program calculations.

**Infrastructure Cost Analysis** – this is an **output** calculation of the total infrastructure costs per semester based on the Class Need Analysis – Actual and Infrastructure Cost per Program calculations.

Revenue Analysis Worksheet:

**Revenue Analysis** – this is an **output** calculation of the total revenue by Program and semester based on the Total Fees and Enrollment Analysis calculations.

**Total Revenue Analysis** – calculation of the total revenue by semester based on the sum of the semester costs from the Revenue Analysis calculation.

**Earnings** – this is an **output** calculation of the total earnings per semester for the school based on the Total Revenue Analysis **output** calculation less the sum of the Total Infrastructure Costs and Total Staff Salary **output** calculations.

1. **How to locate inputs, outputs, and intermediate results**

All of the inputs and input streams that users must enter for the model to work correctly are located on the Inputs worksheet. The Inputs worksheet is the only sheet in the model where inputs and input streams can be entered and modified. Other than some calculations used for headers, the data analysis calculations are grouped by category and located on the corresponding Analysis worksheets – Enrollment Analysis, Class Analysis, Staff Analysis, InfraAnalysis, and Revenue Analysis.

All of the inputs and input streams have named ranges associated with them. This is true for an input of a single cell or a stream. A table of the named ranges in the workbook can be found in the appendix (see Table #A.2).

Most inputs, input streams, and calculations have 3 named ranges associated with them. Take the example of the Maximum Enrollment input on the Inputs worksheet – Inputs!C9:D9.

* Cell D9 alone contains the data and is a named range called “MaxEnrollment”
* Cell C9 alone contains the label and is a named range called “lblMaxEnrollment”
* Range C9:D9 combined are a named range called “inputMaxEnrollment”

The same naming convention would be true for calculations except the combined range of the label and calculation would have a “calc” prefix rather than “input”. An example is range Inputs!B138:N138 which is named “calcHeaderUsed”.

The purpose of this naming convention is to allow the combined range of C9:D9 to be referenced on other worksheets in the model with the data and label combined. By having all references point back to one range the user can’t erroneously change data or labels at different points in the workbook and any updates will ripple through the entire model. For example, if the label for the Maximum Enrollment input was changed to “Total Enrollment” on the Inputs worksheet, that one change would ripple through the entire model and there is no risk of a user changing it to a incorrect label anywhere else in the model.

Also, on each of the analysis worksheets, all of the inputs as well as any calculations from other analysis worksheets that are used in a new calculation on the current worksheet are referenced at either the top of the sheet or next to the new calculation. These references can not be modified; they are simply references to the previous instance of the data. They are only included to increase usability; to make understanding calculations easier by showing all the data used in the calculation on the current sheet.

All calculations use named ranges whenever possible. The majority of the ranges they use are located locally on that worksheet. If the data being used is referenced from a previous worksheet a link is created back to the original data on the original worksheet. Then, a named range is created for the local data on the worksheet that matches the name of the original data. Finally the local named range is used in the local calculation.

For example, the Maximum Enrollment input (Input!inputMaxEnrollment) is used as part of the Enrollment Distribution calculation on the EnrollmentAnalysis worksheet (EnrollmentAnalysis!DistributionCount). The Maximum Enrollment input is referenced on the EnrollmentAnalysis worksheet (EnrollmentAnalysis!C9D9 =Inputs!inputMaxEnrollment). Then the data portion on the Maximum Enrollment reference on the EnrollmentAnalysis worksheet is given the same name as the data range on the data’s original worksheet (EnrollmentAnalysis!D9 is named MaxEnrollment). The new local name is then used in the local calculation: (EnrollmentAnalysis!DistributionCount = EnrollmentDistribution \* MaxEnrollment)).

Again, there are many benefits of implementing this naming strategy. First, it implements the ripple principle so that data is maintained in one location and ripples through the model. Second, if a user or developer wants to see the formula behind the calculation the names make it intuitive. And finally, by referencing all the data used in a calculation on that worksheet the developer/user can see the actual data locally without needing to toggle between worksheets.

A final example of this strategy is how we used it for the period headers. On the Inputs worksheet there is a table named Table Header Calculations (Inputs!B127:N134) that ultimately creates four possible period headers for periods in the model. These are the last four rows of the table. An index of these last four rows named Header No. is then calculated to the left of the table (Inputs!A130:A134 = TableHeaderIndex). Finally, the user inputs a value in the Use Header input (Inputs!A138 = HeaderNumberToUse) and this populates the calcHeaderUsed range to the right of that cell with data from that index row in the table. The content of the calcHeaderUsed range is then used as the period header throughout the model.

1. **Guide to visual cues**

The whole workbook is color coded and a key for each of the colors is included on each page of the model. A copy of the key is included in the Appendix (See Table #A.3). The definitions for each color are listed below:

**Yellow cells** – all inputs entered by the user. These can be modified.

**Light Green cells** – references to inputs values. These can not be modified.

**Pale Blue cells** – new calculations. The majority of these are intermediate calculations used by other calculations and outputs later. The remaining calculations are included for informational purposes.

**Tan cells** – references to previous calculations. The calculations are not being repeated, the cells simply refer to values calculated in other cells.

**Lime cells** – outputs. These are new calculations that show results of the compilation of worksheet calculations.

The color coding of input fields used as labels implements these visual cues based on the ripple principle too. The following label/type input fields and calculations should be color code light green or tan whenever they are referenced in the model:

* + Number of Periods
  + Program Name
  + Staff Type
  + Infrastructure Type
  + Classroom Type
  + Years Abbreviation
  + Semester Abbreviation
  + Use Header

1. **How to make changes**

This model is fairly detailed with a strong framework that was implemented to make maintenance easier in the future.

All inputs and data entry and maintenance should only happen on the Inputs worksheet. The pattern of referencing previous inputs and calculations, including maintaining the color coding, should be implemented. Maintaining the naming conventions (prefixing “lbl”, “input”, and “calc”) would keep continuity and help enforce the ripple principle.

As far as extending the model in the future, the model could be changed significantly around withdrawals and enrollment. The model’s current assumption is that there is always room for students and students are not entitled to refunds after they withdraw. Rather than using a ceiling function we used in the ClassAnalysis!ClassesNeeded calculation, the model could use round. A “Cutoff” input as a percent could be added per Program to signify when the amount of “extra” students would trigger a new class vs. having to reject students. This would create a more economically efficient model by removing the potential of creating a new class if the enrollment was 1 student more than the class maximum size.

However, this would mean turning away students and add the additional wrinkle of refunds. It could be complicated even more with partial refunds, different refund policies around different fees, and a withdrawal rate stream within a semester. It would be very interesting to model but it was way beyond the scope of the current project.

Finally there are a few last maintenance points. We have included VBA code in the appendix for two macros (see Macros #A.4 and #A.5 in the Appendix). The first macro, named List Formulas goes through a worksheet, inserts a new worksheet, and then inserts a list of the formula location, a string of the formula, and the ultimate value the formula returns. The second macro named Get Names goes through the entire model and inserts a new worksheet with a list with 2 columns. The first column is the worksheet name and named range in a worksheetname!namedrange format. The second column is the cells the range references. Finally, the Appendix contains a table of helpful excel formulas that can be used to parse out and sort the results of the Get Names macro (see Table #A.6).

All of these macros and formula will be helpful tools for maintaining the model for several reasons. First, they scan the entire model and return data like names and formulas that are hard to view as a collection. Also, the Get Names macro fails if it comes across a name with a bad cell reference. This is helpful for finding this bad data. However, these macros should only be used for maintenance – they should be removed before the model is released to end users.

Appendix:

Table #A.1 – MS Excel Functions Used with Worksheet

|  |  |
| --- | --- |
| **Function** | **Worksheet** |
| Transpose() | Inputs, StaffAnalysis, InfraAnalysis |
| Column() | Inputs |
| Me | Inputs |
| Int() | Inputs |
| Row() | Inputs |
| Index() | Inputs |
| Lt | EnrollmentAnalysis |
| Up | EnrollmentAnalysis |
| Convolve() | EnrollmentAnalysis |
| FV() | EnrollmentAnalysis |
| SUM() | EnrollmentAnalysis, ClassAnalysis,InfraAnalysis, RevenueAnalysis |
| Round() | ClassAnalysis |
| MMULT() | ClassAnalysis, StaffAnalysis, InfraAnalysis |
| Ceiling() | ClassAnalysis |
| Offset() | InfraAnalysis |
| If() | InfraAnalysis |

Table #A.2 – List of Range Names and locations

| **RangeName** | **Worksheet** | **Cells** |
| --- | --- | --- |
| ClassesNeeded | ClassAnalysis | $C$66:$N$75 |
| calcClassesNeeded | ClassAnalysis | $B$66:$N$75 |
| lblClassesNeeded | ClassAnalysis | $B$66:$B$75 |
| ClassNeedAnalysis | ClassAnalysis | $C$53:$N$62 |
| calcClassNeedAnalysis | ClassAnalysis | $B$53:$N$62 |
| lblClassNeedAnalysis | ClassAnalysis | $B$53:$B$62 |
| ClassSize | ClassAnalysis | $C$24:$C$33 |
| Dn | ClassAnalysis | $A$2 |
| EnrollDistributionCount | ClassAnalysis | $C$11:$C$20 |
| EnrollmentAnalysis | ClassAnalysis | $C$40:$N$49 |
| calcEnrollmentAnalysis | ClassAnalysis | $B$40:$N$49 |
| lblEnrollmentAnalysis | ClassAnalysis | $B$40:$B$49 |
| Lt | ClassAnalysis | $IV$1 |
| Me | ClassAnalysis | $A$1 |
| Rt | ClassAnalysis | $B$1 |
| TotalClasses | ClassAnalysis | $C$77:$N$77 |
| calcTotalClasses | ClassAnalysis | $B$77:$N$77 |
| lblTotalClasses | ClassAnalysis | $B$77 |
| TotalEnrollmentRate | ClassAnalysis | $C$36:$N$36 |
| Up | ClassAnalysis | $A$65536 |
| AdjTutionFees | EnrollmentAnalysis | $C$63:$N$63 |
| calcAdjTutionFees | EnrollmentAnalysis | $B$63:$N$63 |
| lblAdjTutionFees | EnrollmentAnalysis | $B$63 |
| AnnFeeIncrease | EnrollmentAnalysis | $C$26 |
| CumEnrollmentDrop | EnrollmentAnalysis | $C$55:$N$55 |
| calcCumEnrollmentDrop | EnrollmentAnalysis | $B$55:$N$55 |
| lblCumEnrollmentDrop | EnrollmentAnalysis | $B$55 |
| CumEnrollmentRate | EnrollmentAnalysis | $C$48:$N$48 |
| calcCumEnrollmentRate | EnrollmentAnalysis | $B$48:$N$48 |
| lblCumEnrollmentRate | EnrollmentAnalysis | $B$48 |
| DistributionCount | EnrollmentAnalysis | $C$34:$C$43 |
| calcDistributionCount | EnrollmentAnalysis | $B$33:$C$43 |
| lblDistributionCount | EnrollmentAnalysis | $B$34:$B$43 |
| Dn | EnrollmentAnalysis | $A$2 |
| EnrollmentDistribution | EnrollmentAnalysis | $C$15:$C$24 |
| Key | EnrollmentAnalysis | $B$1:$B$5 |
| Lt | EnrollmentAnalysis | $IV$1 |
| MaxEnrollment | EnrollmentAnalysis | $D$9 |
| Me | EnrollmentAnalysis | $A$1 |
| ProjEnrollmentDrop | EnrollmentAnalysis | $C$53:$N$53 |
| calcProjEnrollmentDrop | EnrollmentAnalysis | $B$53:$N$53 |
| lblProjEnrollmentDrop | EnrollmentAnalysis | $B$53 |
| ProjEnrollRate | EnrollmentAnalysis | $C$47:$N$47 |
| ProjGraduationRate | EnrollmentAnalysis | $C$51:$N$51 |
| ProjWithdrawalRate | EnrollmentAnalysis | $C$50:$N$50 |
| RegFees | EnrollmentAnalysis | $C$65:$N$65 |
| calcRegFees | EnrollmentAnalysis | $B$65:$N$65 |
| lblRegFees | EnrollmentAnalysis | $B$65 |
| RegistrationFees | EnrollmentAnalysis | $C$30 |
| lblRegistrationFees | EnrollmentAnalysis | $B$30 |
| Rt | EnrollmentAnalysis | $B$1 |
| SemestersPerYear | EnrollmentAnalysis | $D$11 |
| TotalEnrollmentDrop | EnrollmentAnalysis | $C$54:$N$54 |
| calcTotalEnrollmentDrop | EnrollmentAnalysis | $B$54:$N$54 |
| lblTotalEnrollmentDrop | EnrollmentAnalysis | $B$54 |
| TotalEnrollmentRate | EnrollmentAnalysis | $C$57:$N$57 |
| calcTotalEnrollmentRate | EnrollmentAnalysis | $B$57:$N$57 |
| lblTotalEnrollmentRate | EnrollmentAnalysis | $B$57 |
| TotalFees | EnrollmentAnalysis | $C$66:$N$66 |
| calcTotalFees | EnrollmentAnalysis | $B$66:$N$66 |
| lblTotalFees | EnrollmentAnalysis | $B$66 |
| lblTuition | EnrollmentAnalysis | $B$29 |
| Tution | EnrollmentAnalysis | $C$29 |
| TutionStream | EnrollmentAnalysis | $C$62:$N$62 |
| calcTutionStream | EnrollmentAnalysis | $B$62:$N$62 |
| lblTutionStream | EnrollmentAnalysis | $B$62 |
| Up | EnrollmentAnalysis | $A$65536 |
| YearsCompleted | EnrollmentAnalysis | $C$59:$N$59 |
| Dn | Info | $A$2 |
| Lt | Info | $IV$1 |
| Me | Info | $A$1 |
| Rt | Info | $B$1 |
| Up | Info | $A$65536 |
| AdminPerStudentCost | InfraAnalysis | $C$103 |
| AuditoriumCapacity | InfraAnalysis | $C$13 |
| calcAuditoriumCost | InfraAnalysis | $C$37 |
| ClassesNeeded | InfraAnalysis | $C$54:$N$63 |
| ClassroomCapacity | InfraAnalysis | $C$11:$C$13 |
| ClassroomCosts | InfraAnalysis | $C$23:$C$25 |
| ClassroomInfraCosts | InfraAnalysis | $C$29:$E$31 |
| calcClassroomInfraCosts | InfraAnalysis | $C$28:$E$31 |
| lblClassroomInfraCosts | InfraAnalysis | $C$28:$E$28 |
| CostPerStudent | InfraAnalysis | $C$17:$C$19 |
| Dn | InfraAnalysis | $A$2 |
| InfrastructureCostAnalysis | InfraAnalysis | $C$67:$N$76 |
| calcInfrastructureCostAnalysis | InfraAnalysis | $B$66:$N$76 |
| lblInfrastructureCostAnalysis | InfraAnalysis | $B$67:$B$76 |
| InfrastructureCostPerClass | InfraAnalysis | $D$41:$D$50 |
| calcInfrastructureCostPerClass | InfraAnalysis | $D$40:$D$50 |
| lblInfrastructureCostPerClass | InfraAnalysis | $D$40 |
| LabPerStudentCost | InfraAnalysis | $C$101 |
| LibraryPerStudentCost | InfraAnalysis | $C$102 |
| Lt | InfraAnalysis | $IV$1 |
| Me | InfraAnalysis | $A$1 |
| MediumCapacity | InfraAnalysis | $C$12 |
| calcMediumCost | InfraAnalysis | $C$36 |
| Rt | InfraAnalysis | $B$1 |
| SmallCapacity | InfraAnalysis | $C$11 |
| calcSmallCost | InfraAnalysis | $C$35 |
| StudentInfraType | InfraAnalysis | $B$17:$B$19 |
| TotalInfrastructureCost | InfraAnalysis | $C$79:$N$79 |
| calcTotalInfrastructureCost | InfraAnalysis | $B$79:$N$79 |
| lblTotalInfrastructureCost | InfraAnalysis | $B$79 |
| TotInfraCostByRoom | InfraAnalysis | $C$35:$C$37 |
| calcTotInfraCostByRoom | InfraAnalysis | $C$34:$C$37 |
| Up | InfraAnalysis | $A$65536 |
| AdminPerStudentCost | Inputs | $C$103 |
| inputAdminPerStudentCost | Inputs | $B$103:$C$103 |
| lblAdminPerStudentCost | Inputs | $B$103 |
| AnnFeeIncrease | Inputs | $C$67 |
| inputAnnFeeIncrease | Inputs | $B$67:$C$67 |
| lblAnnFeeIncrease | Inputs | $B$67 |
| ClassroomCapacity | Inputs | $C$112:$C$114 |
| inputClassroomCapacity | Inputs | $B$111:$C$114 |
| lblClassroomCapacity | Inputs | $B$112:$B$114 |
| ClassroomCosts | Inputs | $C$118:$C$120 |
| inputClassroomCosts | Inputs | $B$117:$C$120 |
| lblClassroomCosts | Inputs | $B$118:$B$120 |
| ClassroomType | Inputs | $B$106:$B$108 |
| inputClassroomType | Inputs | $B$105:$B$108 |
| lblClassroomType | Inputs | $B$105 |
| ClassSize | Inputs | $C$56:$C$65 |
| inputClassSize | Inputs | $B$55:$C$65 |
| lblClassSize | Inputs | $B$56:$B$65 |
| CurrentSemester | Inputs | $C$130:$N$130 |
| calcCurrentSemester | Inputs | $B$130:$N$130 |
| lblCurrentSemester | Inputs | $B$130 |
| CurrentYear | Inputs | $C$129:$N$129 |
| calcCurrentYear | Inputs | $B$129:$N$129 |
| lblCurrentYear | Inputs | $B$129 |
| Dn | Inputs | $A$2 |
| EnrollmentDistribution | Inputs | $C$36:$C$45 |
| inputEnrollmentDistribution | Inputs | $B$35:$C$45 |
| lblEnrollmentDistribution | Inputs | $B$36:$B$45 |
| HeaderNumberToUse | Inputs | $A$138 |
| Headers | Inputs | $C$131:$N$134 |
| calcHeaders | Inputs | $B$131:$N$134 |
| lblHeaders | Inputs | $B$131:$B$134 |
| HeaderUsed | Inputs | $C$138:$N$138 |
| calcHeaderUsed | Inputs | $B$138:$N$138 |
| lblHeaderUsed | Inputs | $B$138 |
| InfraCostPerStudent | Inputs | $C$101:$C$103 |
| inputInfraCostPerStudent | Inputs | $B$100:$C$103 |
| lblInfraCostPerStudent | Inputs | $B$101:$B$103 |
| InfrastructureType | Inputs | $B$95:$B$97 |
| inputInfrastructureType | Inputs | $B$94:$B$97 |
| lblInfrastructureType | Inputs | $B$94 |
| inputKey | Inputs | $B$1:$B$6 |
| LabPerStudentCost | Inputs | $C$101 |
| inputLabPerStudentCost | Inputs | $B$101:$C$101 |
| lblLabPerStudentCost | Inputs | $B$101 |
| LibraryPerStudentCost | Inputs | $C$102 |
| inputLibraryPerStudentCost | Inputs | $B$102:$C$102 |
| lblLibraryPerStudentCost | Inputs | $B$102 |
| Lt | Inputs | $IV$1 |
| MaxEnrollment | Inputs | $D$9 |
| inputMaxEnrollment | Inputs | $C$9:$D$9 |
| lblMaxEnrollment | Inputs | $C$9 |
| Me | Inputs | $A$1 |
| PeriodBase | Inputs | $C$127:$N$127 |
| calcPeriodBase | Inputs | $B$127:$N$127 |
| lblPeriodBase | Inputs | $B$127 |
| PeriodHeader | Inputs | $C$131:$N$131 |
| calcPeriodHeader | Inputs | $B$131:$N$131 |
| lblPeriodHeader | Inputs | $B$131 |
| Periods | Inputs | $D$13 |
| inputPeriods | Inputs | $C$13:$D$13 |
| lblPeriods | Inputs | $C$13 |
| ProgramName | Inputs | $B$16:$B$25 |
| inputProgramName | Inputs | $B$15:$B$25 |
| lblProgramName | Inputs | $B$15 |
| inputProjectName | Inputs | $A$1 |
| ProjEnrollRate | Inputs | $C$48:$N$48 |
| inputProjEnrollRate | Inputs | $B$48:$N$48 |
| lblProjEnrollRate | Inputs | $B$48 |
| ProjGraduationRate | Inputs | $C$52:$N$52 |
| inputProjGraduationRate | Inputs | $B$52:$N$52 |
| lblProjGraduationRate | Inputs | $B$52 |
| ProjWithdrawalRate | Inputs | $C$50:$N$50 |
| inputProjWithdrawalRate | Inputs | $B$50:$N$50 |
| lblProjWithdrawalRate | Inputs | $B$50 |
| RegistrationFee | Inputs | $C$71 |
| inputRegistrationFee | Inputs | $B$71:$C$71 |
| lblRegistrationFee | Inputs | $B$71 |
| Rt | Inputs | $B$1 |
| SemesterAbrv | Inputs | $C$124 |
| SemesterHeader | Inputs | $C$132:$N$132 |
| calcSemesterHeader | Inputs | $B$132:$N$132 |
| lblSemesterHeader | Inputs | $B$132 |
| SemestersPerYear | Inputs | $D$11 |
| inputSemestersPerYear | Inputs | $C$11:$D$11 |
| lblSemestersPerYear | Inputs | $C$11 |
| StaffPerClass | Inputs | $C$83:$G$92 |
| inputStaffPerClass | Inputs | $B$82:$G$92 |
| lblStaffPerClass | Inputs | $B$83:$B$92 |
| StaffSalary | Inputs | $C$75:$C$79 |
| inputStaffSalary | Inputs | $B$74:$C$79 |
| lblStaffSalary | Inputs | $B$75:$B$79 |
| StaffType | Inputs | $B$28:$B$32 |
| inputStaffType | Inputs | $B$27:$B$32 |
| lblStaffType | Inputs | $B$27 |
| TableHeaderIndex | Inputs | $A$131:$A$134 |
| Tution | Inputs | $C$70 |
| inputTution | Inputs | $B$70:$C$70 |
| lblTution | Inputs | $B$70 |
| Up | Inputs | $A$65536 |
| YearAbrv | Inputs | $C$123 |
| YearCompleted | Inputs | $C$128:$N$128 |
| calcYearCompleted | Inputs | $B$128:$N$128 |
| lblYearCompleted | Inputs | $B$128 |
| YearHeader | Inputs | $C$133:$N$133 |
| calcYearHeader | Inputs | $B$133:$N$133 |
| lblYearHeader | Inputs | $B$133 |
| YearSemesterHeader | Inputs | $C$134:$N$134 |
| calcYearSemesterHeader | Inputs | $B$134:$N$134 |
| lblYearSemesterHeader | Inputs | $B$134 |
| \_FilterDatabase | NameTest | $A$1:$E$264 |
| AdjTutionFees | RevenueAnalysis | $C$58:$N$58 |
| AnnFeeIncrease | RevenueAnalysis | $C$23 |
| Dn | RevenueAnalysis | $A$2 |
| EnrollDistributionCount | RevenueAnalysis | $C$10:$C$19 |
| EnrollmentAnalysis | RevenueAnalysis | $C$11:$N$20 |
| InfrastructureCost | RevenueAnalysis | $C$43:$N$43 |
| Lt | RevenueAnalysis | $IV$1 |
| Me | RevenueAnalysis | $A$1 |
| RegFees | RevenueAnalysis | $C$60:$N$60 |
| Revenue | RevenueAnalysis | $C$39:$N$39 |
| Rt | RevenueAnalysis | $B$1 |
| StaffSalary | RevenueAnalysis | $C$41:$N$41 |
| TotalEarnings | RevenueAnalysis | $C$45:$N$45 |
| calcTotalEarnings | RevenueAnalysis | $B$45:$N$45 |
| lblTotalEarnings | RevenueAnalysis | $B$45 |
| TotalEnrollmentRate | RevenueAnalysis | $C$37:$N$37 |
| TotalFees | RevenueAnalysis | $C$23:$N$23 |
| TotalRevenue | RevenueAnalysis | $C$39:$N$39 |
| calcTotalRevenue | RevenueAnalysis | $B$39:$N$39 |
| lblTotalRevenue | RevenueAnalysis | $B$39 |
| TutionStream | RevenueAnalysis | $C$57:$N$57 |
| Up | RevenueAnalysis | $A$65536 |
| Years | RevenueAnalysis | $C$54:$N$54 |
| ClassesNeeded | StaffAnalysis | $C$32:$N$41 |
| Dn | StaffAnalysis | $A$2 |
| Lt | StaffAnalysis | $IV$1 |
| Me | StaffAnalysis | $A$1 |
| Rt | StaffAnalysis | $B$1 |
| StaffAnalysis | StaffAnalysis | $C$46:$N$50 |
| calcStaffAnalysis | StaffAnalysis | $B$45:$N$50 |
| lblStaffAnalysis | StaffAnalysis | $B$46:$B$50 |
| StaffPerClass | StaffAnalysis | $C$19:$G$28 |
| StaffSalary | StaffAnalysis | $C$11:$C$15 |
| StaffSalaryAnalysis | StaffAnalysis | $C$54:$N$58 |
| calcStaffSalaryAnalysis | StaffAnalysis | $B$53:$N$58 |
| lblStaffSalaryAnalysis | StaffAnalysis | $B$54:$B$58 |
| TotalStaffSalary | StaffAnalysis | $C$61:$N$61 |
| calcTotalStaffSalary | StaffAnalysis | $B$61:$N$61 |
| lblTotalStaffSalary | StaffAnalysis | $B$61 |
| Up | StaffAnalysis | $A$65536 |

Table #A.3 – Color Key for data types

|  |  |
| --- | --- |
| **Key** | **Refers to** |
| Inputs | Cells that accept values |
| Input References | Cells that refer to specific input values |
| Calculations | Cells with formulas |
| Calculation References | Cells that refer to specific formulas |
| Outputs | Final results from formulas |

Macro #A.4 – List Formulas

Sub ListFormulas()

Dim FormulaCells As Range, Cell As Range

Dim FormulaSheet As Worksheet

Dim Row As Integer

' Create a Range object for all formula cells

On Error Resume Next

Set FormulaCells = Range("A1").SpecialCells(xlFormulas, 23)

' Exit if no formulas are found

If FormulaCells Is Nothing Then

MsgBox "No Formulas."

Exit Sub

End If

' Add a new worksheet

Application.ScreenUpdating = False

Set FormulaSheet = ActiveWorkbook.Worksheets.Add

FormulaSheet.Name = "Formulas in " & FormulaCells.Parent.Name

' Set up the column headings

With FormulaSheet

Range("A1") = "Address"

Range("B1") = "Formula"

Range("C1") = "Value"

Range("A1:C1").Font.Bold = True

End With

' Process each formula

Row = 2

For Each Cell In FormulaCells

Application.StatusBar = Format((Row - 1) / FormulaCells.Count, "0%")

With FormulaSheet

Cells(Row, 1) = Cell.Address \_

(RowAbsolute:=False, ColumnAbsolute:=False)

Cells(Row, 2) = " " & Cell.Formula

Cells(Row, 3) = Cell.Value

Row = Row + 1

End With

Next Cell

' Adjust column widths

FormulaSheet.Columns("A:C").AutoFit

Application.StatusBar = False

End Sub

Macro #A.5 – Get Names

Sub getNames()

Set nms = ActiveWorkbook.Names

Sheets.Add

For r = 1 To nms.Count

ActiveSheet.Cells(r, 2).Value = nms(r).Name

ActiveSheet.Cells(r, 3).Value = nms(r).RefersToRange.Address

Next

End Sub

Table #A.6 – Parsing formulas for Get Names Results

|  |  |
| --- | --- |
| **Purpose** | **Formula** |
| To extract the worksheet from the worksheet!range formatted cell named NamedRange | =MID(NamedRange,1,SEARCH("!",NamedRange,1)-1) |
| To extract the RangeName from the worksheet!range formatted cell named NamedRange | =MID(NamedRange,SEARCH("!",NamedRange,1)+1,LEN(NamedRange)-SEARCH("!",NamedRange,1)) |
| To extract the "lbl", "calc", or "input" prefix from a RangeName | =IF(LEFT(Range,4)="calc",LEFT(Range,4),IF(LEFT(Range,5)="input",LEFT(Range,5),IF(LEFT(Range,3)="lbl",LEFT(Range,3),""))) |
| To extract the data range name from a prefixed Range for grouping | =IF(prefix="calc",RIGHT(Range,LEN(Range)-4),IF(prefix="input",RIGHT(Range,LEN(Range)-5),IF(prefix="lbl",RIGHT(Range,LEN(Range)-3),Range))) |