STUDENT PROJECTS COMBINE FACULTY GUIDANCE WITH INDEPENDENT WORK

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(The attached PDF file has better formatting.)

The discussion forums have extensive guidance for the student projects: project templates, illustrative spread-sheets, and step-by-step guides. Study the project templates that interest you, review the illustrative spread-sheets so you understand the statistical work required, and read some of the previous student projects on the discussion forums so you see what type of report is expected.

The SOA/CAS VEE Administration committee wants the student projects to show that candidates understand how to apply the statistical techniques to real data, test hypotheses, build models, and use the material from the on-line courses to perform regression and time series analyses. If the student projects required candidates simply to follow instructions, they would not satisfy these requirements.

If we gave step-by-step instructions: "Do A, then B, then C, …" the student project would be an extended homework assignment. If we said: "Do an independent student project using statistical software showing how to apply F tests (or dummy variables or generalized linear models), build ARIMA models, or similar items," many candidates would be overwhelmed by the task.

The on-line courses provide the education desired by the SOA and CAS and are accessible to all candidates, even if they have not done previous statistical work. The discussion forum provides you with tools, data, and guidance for the student project but does not write the project for you.

This dialogue explains the balance between faculty guidance and independent work. If some instruction is obscure, don't think that our faculty is remiss. They spent weeks structuring each project template so that if you understand the course material, the requirements are clear and you can complete the project efficiently. If you don't understand the course material – if you don't understand *F* tests, dummy variables, or ARIMA modeling – the project templates are hard.

Some candidates have limited proficiency with Excel. Excel can do the work needed for the student projects, but you must have the expertise. If our faculty set up Excel spread-sheets that did the analysis for you, the student project would not receive credit. If we just directed you to web sites with suitable data, you would need several days to compile the information. Without project templates and guides on the discussion forums, many candidates would not complete the course.

The on-line courses are for your benefit. If something is unclear, take a breath. We do not give a step-by-step guide for your student project, but we give enough guidance that you can complete the project. If you have questions, post them on the discussion forum and we will answer them. We can't do the project for you, but we give enough guidance that you will succeed.

Jacob: Do many candidates have difficulty with the student projects?

Rachel: Most candidates produce good projects; some projects are excellent. Some candidates have done statistical analyses in college or at work that can be adapted for the on-line courses. The student project shows that you can apply statistical techniques to actual data. It need not follow the project templates on the discussion forum; these are suggestions to help you select a topic, not requirements.

Illustration: A candidate may regress auto insurance loss cost trends on inflation indices for an auto pricing project at work. The insurer's focus is on setting premium rates. For the regression analysis student project, the candidate may use the same data and examine

~   multicollinearity among different inflation indices
~   serial correlation in the residuals

~   heteroscedasticity in the error terms
~   *F* statistics to decide if the relation differs in two periods

These are suggestions; the student project need not cover all of them. One candidate might examine serial correlation in the residuals and the independent variable, showing how the two inter-relate, and explain how this affects the statistical inferences; this is sufficient for a student project. Another candidate might compute the Durbin-Watson statistic using an illustrative spread-sheet on the NEAS web site and conclude that the residuals are not serially correlated. This student project doesn't do enough; independent work is needed.

Jacob: If we are unsure if the student project is sufficient, what should we do?

Rachel: If you have a choice of two statistical tests, do both. Err on the side of too much work, not too little. It takes an extra hour for the additional material, but you can be certain you will complete the course. You can also provide more explanation or examine more scenarios. If you use an *F* test to examine a hypothesis, and your student project seems too short, you can segment your data into two groups and apply the test to each group. The smaller data sets cause more random fluctuation and lower significance for your results.

Jacob: If I think my project is sufficient, but I am not sure, should I send you an email explaining the project to verify that it suffices?

Rachel: We can not decide if your student project is sufficient until our faculty reviews it. Once you think your project is sufficient, send it in with a complete write-up. If the project is good, you get credit. If the project is not sufficient, we send it back with comments.

Jacob: If I can't get my statistical technique to work, can I send you my spread-sheet so you can fix it?

Rachel: We can not do the project for you. We give enough guidance that all candidates can complete the student projects, but we do not over-specify the work needed. The student project shows independent work. If you want to do a certain project but you can't get the statistical techniques to work, do a different project. We can answer questions and explain the statistical procedures, but we can't do your project.

Jacob: Why not give a list of steps that we must complete to receive VEE credit?

Rachel: The SOA and CAS want *independent* student projects. If we gave a list of steps for the student project which candidates apply to their data, the student projects would not be sufficient. The student project is not a homework assignment showing that you can follow instructions. It shows that you can apply the statistical techniques to actual data.

The on-line courses provide the education desired by the SOA and CAS. We provide the level of detail in the instructions and the illustrative work-sheets that best fulfills the SOA and CAS educational requirement and provides the guidance needed by you to meet them. As we review and grade the student projects, we see what topics are most confusing and we provide more detailed explanations.

We err on the side of caution. We ask our faculty not to do the work for a candidate. Our faculty helps you understand the material, but the student project is your work.

Jacob: What type of guidance do you provide?

Rachel: We provide step-by-step guides with much discretion for the candidate. We can't tell you "Do exactly this or that." We explain what you do in each step, and we provide examples. The step-by-step guide on ARIMA modeling shows the steps needed, but you must combine this guide with the techniques taught in the course.

Jacob: Some candidates do not have statistical software. What do you provide them?

Rachel: We explain the Excel procedures that are available, such as the *REGRESSION* add-in. We provide illustrative spread-sheets for more complex statistical techniques, such as the Durbin-Watson statistic, the Box-Pierce Q statistic, and correlograms. You can copy these illustrative spread-sheets and modify them for your student project.

Illustration: The figures needed for the *F* test are provided by the *REGRESSION* add-in. We explain the *F* test extensively in the postings, and we direct you to the Excel functions. You must understand the ESS, RSS, or R^2 and how to find them in the regression output. We explain how to compute the degrees of freedom, but you must do the work.

Jacob: How do we get data for the student project?

Rachel: You can use any data you want, from other web sites, from work, or even data which you simulate. We also provide spread-sheets with data for dozens of potential student projects. You can use the time series and regression data on the NEAS web site.

Jacob: If we are overwhelmed by the student project, what should we do?

Rachel: We have illustrative spread-sheets that are extensively documented by postings on the discussion board. We have posted several past student projects on the discussion forum as well, so you can see what other candidates have done. Review these postings and the past projects.

Jacob: There is so much to read; where do I start?

Rachel: We avoid giving you a step-by-step guide that shows the order for your student project. Many postings explain the elements of the student project; you put them together.

Start with the posting on the written student project. Some candidates are not accustomed to written reports. This posting has two objectives:

~   It explains what the written student project contains. This posting is a minimum guide for candidates with writer's block. The student project is not a literary work. We do not grade your writing style. Simple, clear description is best.
~   This posting should relieve your anxiety about what we expect. This is not a master's thesis on an innovative research project. The student project shows the NEAS faculty that you can apply statistical techniques to real data.

Jacob: What postings should we read first for the statistical parts of the student project?

Rachel: If you do the time series student project, read the step-by-step guide to forming ARIMA models. The examples in the textbook are sophisticated, examining a variety of ARIMA processes. The step-by-step guide covers the basic statistical techniques.

If you do a regression analysis student project, review the templates on sports won-loss records or non-constant parameters in loss reserving. Both project templates are fully documented. Each project template has illustrative spread-sheets with the type of data that may be used for a student project. The loss reserving project uses dummy variables; the sport won-loss records project uses *F* statistics.

Jacob: Some candidates are unsure what is expected of them. How do you deal with this?

Rachel: We continually add dialogues between Jacob and Rachel as we grade the student projects. Jacob's questions are drawn from questions in past projects, and Rachel gives the instructor's answers. Some of Jacob's questions are modeling questions which candidates have asked. If you have other questions, post them on the discussion forums are we will answer them. You can also send an email to the NEAS office, and the course instructor will reply.

We post some past student projects with comments by the NEAS faculty. Reviewing these projects gives you ideas for your own project. The discussion forums have six hundred student projects on different topics, culling data from internet web sites and applying a variety of statistical techniques. *We do not show the Excel spreadsheets for these projects, lest other candidates copy them.*

We post illustrative work-sheets with the statistical techniques. We suggest additional topics for the student projects, such as modeling of corporate bond spreads, unexpected inflation, real interest rates, GDP and other measures of income, unemployment, and simulation projects.

Jacob: Can we use the same techniques as these projects use? Can we choose another time series and apply the same techniques?

Rachel: Use the techniques in the on-line course, though the inferences and conclusions must be your own. Once you understand how to run regressions and use the techniques in the textbook, the mystery of the student projects disappears. The student project shows that you can apply the techniques to real data; it does not require innovative research studies.

Jacob: How long does it take to read through all the illustrative spread-sheets, the past projects, the postings, the step-by-step guides, and the dialogues?

Rachel: You don't need to read everything before starting your project. The student project shows that you can apply statistical techniques to real data. The discussion forum postings are illustrative. Once you have an idea for a project, do the analysis and write it up.